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Co-ordinating Power and Heat

BY far the greater proportion of coal mined in Great Britain is burned in a raw state. For the purposes of some large industries this is inevitable, and in many of these the combustion of coal provides fuel in the more advanced stage of preparation required by certain process work.

Although the number of factory chimneys that belch forth smoke is being reduced, due to an appreciation of the economic advantages of electrification, the domestic chimney still remains as the worst offender in its pollution of the atmosphere. Correspondingly harmful effluents could not be discharged into a river without the culprits incurring penalties.

The essential point is that coal, as it affects the public, should be regarded as raw material from which such derivatives as electricity, gas, coke, smokeless fuel and oil can be obtained. Its value, like that of money, lies not in itself but in what it can be exchanged for—in this case, the heat and motive power required by industry and by the householder.

Coal is, as Sir Philip Dawson reminded the Institute of Fuel in his presidential address, the greatest source of our national wealth and the foundation upon which our industrial life has been built. In spite of this, very little information is available of a comprehensive nature as to the thermo-dynamic requirements of industry, and wasteful as the effect of this lack of knowledge may be at the moment, its effect on future prosperity is likely to be much more pronounced.

To rectify these disadvantages, Sir Philip urges that steps should be taken immediately to set up a central advisory authority, to be appointed by the Government, with a view to co-ordinating the fuel industries. This authority would also undertake research on fuel technology, the need for which was so forcefully stated by Lord Hirst in his presidential address to the same Institute a few years ago.

Sir Philip makes it quite clear that by co-ordination he does not mean control, as the power of the new body would be limited to collecting and analysing available experience and knowledge, and, in conjunction with a committee of technical and commercial representatives of various industries, advising the Government as to the lines that should be followed in the national interest, particularly in opening new channels for increasing the output of the mines.

Some have feared that central co-ordination might disguise a paternal attempt to delimit the spheres of activity of industries distributing the products of coal to the consumer. Sir Philip Dawson, however, who has been a prominent spokesman in Parliament on electrical matters, makes it plain in this respect also that his recommendations are not in any way intended to restrict the unfettered development of such industries.

There are many ways in which these competing industries can profitably co-operate, such as in securing consistent grading, quality and quantity of fuel, negotiating with highway authorities and in pressing for adequate illumination of public streets. There is, however, no question of the abandoning of any field of operation by the industries that are now serving the public in healthy rivalry.

American Power Policy

IN spite of the opposition which the Tennessee Valley Authority has encountered, the United States Government intends to proceed with its power development programme. In inaugurating the Bonneville Dam project recently, President Roosevelt said that the power from Bonneville would be distributed as widely as possible and no differentiation of rates would be made in respect of transmission distance. It was proposed to set up seven or eight regional planning boards on the lines of the T.V.A. These would be in much closer touch with the needs of their localities

than the Washington authorities. He promised that the boards would not supplant existing undertakings, from which it appears that their duties will be largely in the direction of co-ordination of resources. The President made it clear that there was no intention of instituting a "dangerous national centralised control."

Avoiding Over-centralisation

WHILE electrical people are in general agreement that distribution methods should be improved, views as to how this should be done vary within wide limits. Some believe that a removal of restrictive early legislation is all that is required; at the other end of the scale are those who advocate a symmetrical plan under Government control. In his presidential address to the Association of Supervising Electrical Engineers on Tuesday, Mr. J. R. Beard steered a course about midway between the extremes. Although no supporter of a *laissez-faire* policy, being, indeed, an advocate of the grouping of undertakings over large areas which was the basis of the McGowan Report, he showed an appreciation of the risks of over-centralisation and of the value of local initiative. While favouring a greater degree of co-ordination in essential particulars, he would make the most of the enterprise, diversity of experience, and other virtues inherent in existing organisations that have evolved (with many other less desirable features) as a result of the way in which the industry has grown up—untidily, perhaps, yet with life enough to work out its own salvation.

Variety at the Institution

THE London session of the Institution of Electrical Engineers commenced last evening with the delivery of his presidential address by Sir George Lee, but already several of the chairmen of the provincial centres have given their addresses, some of which are dealt with in this issue. This year, perhaps more than ever before, the addresses are full of practical interest, and their variety would almost suggest that there has been co-ordination to avoid overlapping. The subjects range from steel mills to the engineer's status, and, of course, the burning question of distribution is not overlooked. The variety and interest which we have mentioned extends to the general programme for the session, which includes papers on street traffic signals, railway electrification (Paris-Orleans and Midi Railway), safeguards against the interruption of supply, the design and maintenance of domestic cookers, and electrical engineering education. The informal meetings show a similar diversity, and so the session should be a lively one.

Co-operation in Industry

ADDRESSING the members of the British Engineers' Association last week, Lord Dudley Gordon, the president of the Association, spoke of the extent to which concerns who were rivals in business were now co-operating in matters of common interest. He showed that the individualistic suspicion which used to permeate industry was gradually being dispelled. In many directions—protection against actions contrary to the best interests of an industry, guarding against excessive and wasteful competition, price cutting, the standardisation of conditions of contract, the supply of information as to the status of inquirers, market possibilities, the suitability of agents and the settling of wages and conditions of employés—co-operation was proving of inestimable benefit. There was, however, a point beyond which it should not go. Two of the strongest incentives to turning out good work were competition and the hope of personal profit. If these were removed improvement in efficiency and the reduction of costs would cease.

Anticipating the Load

WE recently visited a large foreign super-power station in which a very interesting device was installed with a view to giving the engineers in charge of the boiler-room and the turbine-room respectively a very good idea of what the load would be *during the next four hours ahead*. Based upon the recorded information in the main control-room of the station of the actual load at the corresponding time a year previously, the growth of the supply, and any special local factors which might influence the demand, a chart is prepared giving continuously the anticipated load for the next four hours. This is electrically communicated to the boiler-room and the turbine-room control panels in the form of four illuminated graphs arranged side by side in four small instrument dials of rectangular shape, each about 8in. by 3in., one for each hour ahead. The graph shown is changed each hour, and thus the charge engineers in both the boiler-room and the turbine-room are always aware of the extent to which the load may be expected to vary, and they can, therefore, arrange accordingly. The main control-room subsequently adds to its master chart the graph of actual load to the same ordinates as the anticipated load, and we were surprised to observe how close was the agreement between the two.

Training and Responsibility

A MEDICAL student can be admitted to full membership of his profession upon completing his training and can commence to practise (ominous word!). An electrical engineering student with excellent theoretical and practical training cannot receive the *cachet* of corporate membership of his Institution until he has had from two to five years (according to his training) in a responsible position as an electrical engineer. In his address as chairman of the North-Western Centre of the I.E.E., Mr. J. W. Thomas pointed out that this requirement bears hardly upon those who may not have had the good fortune to secure a "responsible" position. Although well-trained theoretically and practically, they may not have found suitable vacancies, or promotion may have been slow, so that they have had to remain in semi-responsible posts. The qualification "chartered electrical engineer" is becoming increasingly recognised, so that such men are under a real handicap and their position would be considerably worsened if there were ever a scheme of compulsory registration of engineers, however remote the possibility of this may be.

Busy Bradford

OWING to abnormal pressure of work in the laying of new mains for services, it was not possible to proceed with any scheme for changing over the system of supply at Bradford during the year ended March 31st last. The net increase in consumers—7,247—was 3,746 in excess of the previous highest, and the extent of the new and additional supplies was also exceptionally large at 28,703 kW. A considerable number of applications for power supplies above 50 h.p. were received, and aggregated 2,100 h.p., besides which an additional 6,555 domestic premises were connected, or 2,400 more than in the preceding year. There are now a large number of works canteens in the city in which cooking is entirely, or to a large extent, by electricity, and there is little doubt that the Department's canteen, which is equipped with the latest form of electrical apparatus, has been of material assistance in bringing about this development.

Rutherford

THE term "genius," so difficult to define, was, at any rate, unmistakably exemplified in the late Lord Rutherford. A capacity for bold speculation is common enough, but not the intuitive insight into scientific truth and the aptitude for close thought and hard work that unfailingly confirmed his deductions. As an experimentalist of the highest order—irrespective of time or circumstance—he is naturally compared with Faraday, but the parallel may be drawn further in an appreciation of the rare personal qualities that distinguished both men. The ultimate consequences of Rutherford's work are immeasurable, but his inimitable gift of communicating his inspiration and enthusiasm to his co-workers and pupils has ensured that the line of thought he started will be carried to conclusions that will be of immense importance to the world.

North-East Coast Activities

Electrical manufacturers busy

Processes and products seen during a tour of leading electrical works in the Tyneside area

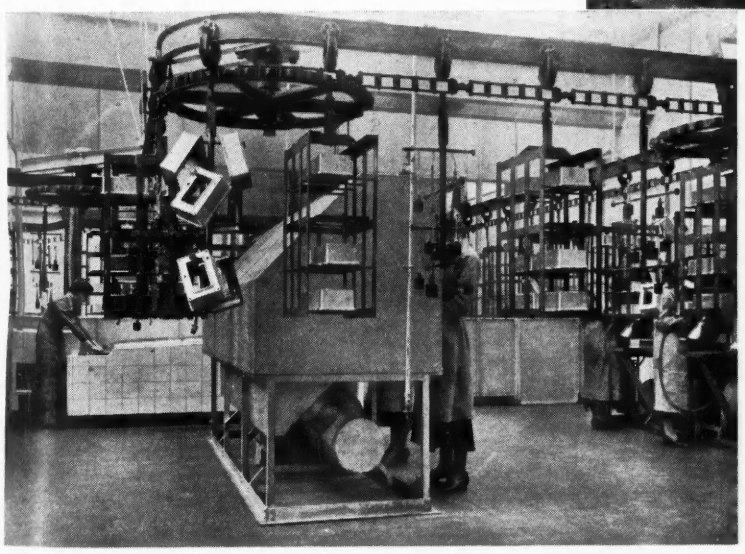
TO attempt to digest in two days the practice and policies of six large organisations, each with a complete identity though inter-related, would have been a task almost too formidable to contemplate without the urge to pay tribute to their efforts to maintain industry in an area so badly depressed as Tyneside has been.

Since our last tour four years ago the ground area covered by the workshops and offices of A. Reyrolle & Co., Ltd., has increased by 41 per cent. and the total floor area by 71 per cent. The site area is 79 acres, of which 15 acres has been built upon. The works floor area is 604,843 sq. ft., testing stations and laboratories cover 45,350 sq. ft., while the offices and electrically equipped canteens cover 102,251 sq. ft. The 5,213 employés represent a 60 per cent. increase in four years. A shop built last year added 34,000 sq. ft. for the assembly of airbreak switchgear, control boards and distribution equipment. This shop is now being doubled in size, and its enamelling section is noteworthy for its glass enclosures and spraying booths and ovens fitted with overhead conveyors for continuous stoving.

A new relay shop was put into commission early this year, enabling assembly and testing to be done progressively under one roof. Vibration is minimised by housing the machines in an annexe which is insulated from the main test room, which is type-sectionalised. There is a sound-proof chamber in which relays are tested for silent operation.

The packing and dispatching departments were extended last year; a new bakelite moulding shop is under construction, and a store of 12,000 sq. ft. area has been provided solely for castings, including inspection and rust-proofing sections. The existing New Town works machine shop with its stores and inspection sections covers 240,000 sq. ft. The structural steel frame is now being erected for No. 2 machine shop, which will add 57,760 sq. ft. for heavier work.

The electric welding and flame cutting now done in the New Town works is to be transferred to one of the new buildings. In the area thus freed 133 new machine tools are to be installed, together with "Hicycle" grinding equipment. Most of those more recently acquired are driven by multi motors, belt shafting being avoided. Additional equipment at the foundry is to include an electric arc melting furnace.

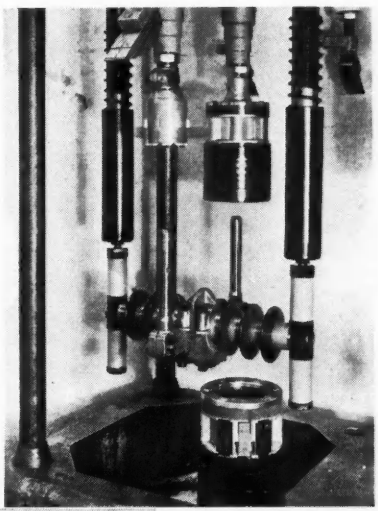


Such expansion as has been outlined has naturally necessitated the provision of more heating plant. The boiler houses at both works have been doubled, and at the Hebburn works a fuel store is being laid out with new scraper plant for handling the coal.

Component parts for switchgear, motors, and even domestic vacuum cleaners are smoothly merged in the machining shops. But the assembly of J. H. Holmes & Co.'s motors, electro-plating dynamos, welders for up to 100 operators, and similar specialities (though under the same roof) is separate so far as works organisation is concerned.

Motor-driven alternators are supplied from these works for the Actadis Co.'s carrier current system of distant control, which enables grouped switching to be centralised without the use of pilot wires. The generator is capable of providing several differing high frequencies, which can be selected remotely from the set and imposed through transformers on the high-voltage network, to actuate relays on the low-voltage feeders. More recently much simpler and smaller emitters have been supplied for injecting high-frequency impulses directly into low-voltage networks.

Six Holmes' printing press drives are now being installed for the Newcastle Chronicle, Ltd., each main d.c. motor being of 150 b.h.p. Several duplex a.c. variable speed commutator-type drives are being made for other British newspapers, and "unit drives" are also in hand for installation at home and in the Dominions. In this case an individual motor is fitted to each printing unit and folder, so that in the event of a fault the affected part can be isolated while the load is shared by the remainder, thus enabling the press to complete its run.



Electrode boilers for large-scale heating and domestic water heaters are examples of efforts to foster the use of load-consuming devices; together with "sun-ray" lamps (marketed by the Thermal Syndicate) and suction cleaners, which are now sold by Eureka Electric, Ltd., only through selected dealers, thus materially reducing distribution costs.

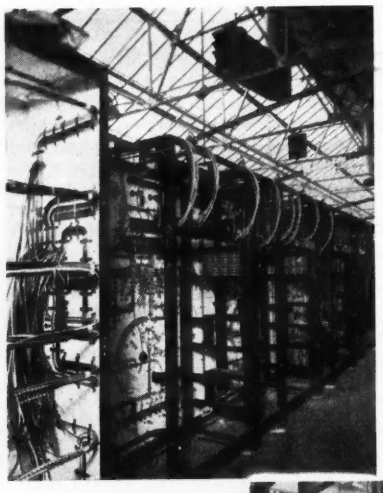
Above: One phase of a 1,200-A, 33-kV type M5T Reyrolle circuit-breaker with one of the turbulator contacts removed. Left: Reyrolle's spraying shop showing the conveyor belt and spraying cabinets

High-voltage testing has more recently been combined with heavy current research. The space devoted to this work has grown by 300 per cent. and new buildings have been erected at the Hebburn works which will increase the laboratory area from 4,860 to 13,800 sq. ft.

In the first bay there are to be five 6 V 1,000-A transformers, and the 50-cycle artificial pilot at present in the old laboratory will be transferred. The effective test areas will be increased from 810 to 2,070 sq. ft. A silence-chamber at one end for tests of insulators has a special soundproof trap-door in the roof through which heavy equipment can be lowered by an overhead crane. The 150-kV transformer for insulator testing is to be installed outside the chamber, and the moving-coil regulator for voltage-control push-button controlled from inside. The test supply will enter through a condenser bushing in the roof, and the voltage indication is obtained by measuring the capacity current of the roof bushing, which is specially calibrated for the purpose.

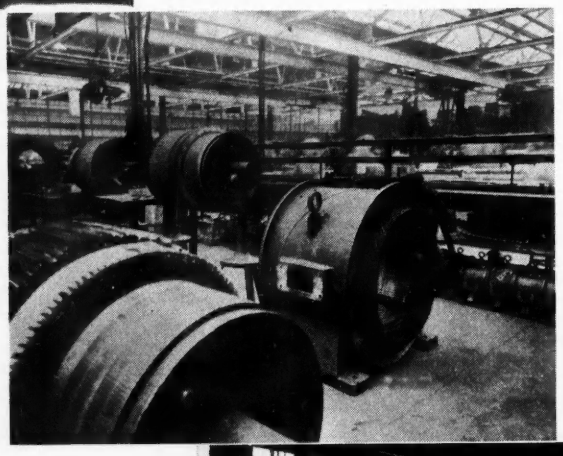
The second bay is primarily designed to house a cathode-ray measuring device, and an impulse generator of the Marx

circuit type for 1,500,000 V. A one-metre sphere-gap will be erected alongside the oil tank, which is in a pit, and has required special consideration in design, the top being kept large (24 ft. in diameter) to restrict surface flashover, whereas the bottom is reduced where possible in order to save oil. Even so, some 20,000 gallons (81 tons) of oil will be required to fill the tank, and it can be heated up to 90 deg. C. in 24 hours by means of high temperature water.



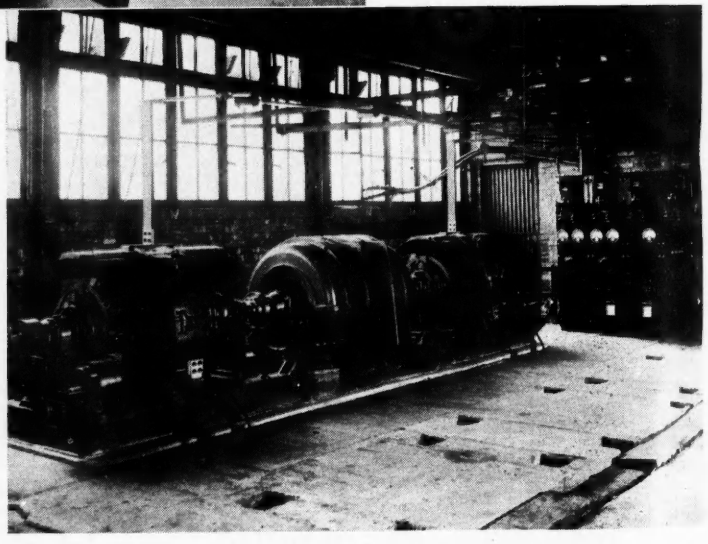
Rear of control boards for 180 h.p. d.c. equipment for rotary newspaper presses

There is a double-deck observation gallery along both long sides of the bay, and the portable control apparatus will be available in any gallery. It will be windowless to ensure darkness for observing high-voltage phenomena. The end of the bay is partitioned off into enclosures for duration tests, giving an area of 450 sq. ft., compared with 80 sq. ft. in the present cage. Three tapped transformers for 150,000, 45,000 and 33,000 V are being provided, together with oil tanks, which, again, can be water heated.



Holmes 125-b.h.p. a.c. commutator motors in course of construction

The third bay is divided into five enclosures principally for insulation testing. There is a complete Schering-bridge equipment for up to 200,000 V, and a pressure-testing enclosure for use up to 100,000 V at 50 cycles. The third enclosure is taken up by an X-ray equipment for insulation examination, and is complete with its own dark-room. The fourth enclosure is a workshop for general maintenance of apparatus, and for making up apparatus for test and subsequently breaking it up for inspection. The fifth enclosure houses an instrument transformer testing equipment. The 100,000-V equipment and the instrument transformer testing equipment are being transferred from the existing laboratory to the larger new buildings, and the X-ray equipment is being transferred from the chemical laboratory.



An 80-operator 250-kW motor-generator welding set for shipyard use

Bay four is equipped for unpacking, inspection and acceptance testing, and includes a pressure-testing enclosure, silence chambers for hissing tests, and hydraulic testing apparatus. There is an oil storage and purifying equipment for all test rooms, and space is available for a new laboratory machine room and a supply sub-station. When some of the equipment is moved from the existing electrical laboratory it will free the main cage for e.h.v. testing alone. The 450,000-V and 150,000-V testing transformers were specially designed for use in conjunction, so as to give a maximum a.c. at 600,000 V.

Besides all this, the Associated British Short-circuit Testing Station, Ltd., has doubled its facilities, and is now capable of furnishing an initial symmetrical output of 2,000,000 kVA. The generating plant, to which a second machine was added a little while ago, now serves two separate and detached test bays, each with workshops, analysing instruments and offices, which can be hired by anyone desiring to carry out short-circuit tests. Some 500,000 kVA is available in the new bay and new 24-element Cambridge electromagnetic oscillographs are to be installed in both bays. The films are 3 ft. 3 in. long and 1 ft. wide, and motor driven gearing provides drum speeds of from 0.2 to 3.5 metres per second.

The Cambridge high-voltage cathode-ray oscillograph takes a film 2 metres long, and records at a film-speed of 224 miles per hour. The timing circuits are arranged to record for 0.1 second, with five revolutions per exposure; and the beam is moved across the drum axially each revolution. Each centimetre represents 1/10,000 second, and natural oscillation frequencies up to 100,000 cycles can be recorded and analysed.

Tests made at this and similar stations entitle Great Britain to claim not only the initiation of the recent international circuit-breaking and -making specification, but also the first national specification to be based thereon (B.S.S. No. 116, 1937) which is to be published this month. And so it was perhaps not entirely coincidence that led us to witness at Hebburn last week "proving" tests intended to show how metal-clad switchgear is already being made fully to comply with the latest requirements.

The rupturing of 1,500,000 kVA with two generators in parallel proved to be far less spectacular than other tests arranged to demonstrate how the severely disruptive consequences of a fault on cable-connected bus-bars could be reduced almost to insignificance by zone-protective isolation, if sufficiently rapid to prevent arc persistence becoming uncontrollable. Within metal-clad structures that have changed very little there are now such features as turbulators for arcing tips and tank gases which represent test development found reliable in practice.

Overseas business represents one-third of the Reyrolle output, and some types of switchgear are manufactured elsewhere under licence; for example, in Holland, Denmark, Germany, France, America and Japan.

The manufacture of insulating materials on Tyneside was instituted by the Bushing Co., Ltd., a joint Reyrolle-G.E.C. concern with about 300 employés making bakelised paper products. And now, in association with I.C.I., another factory close by has just commenced making fire-resisting cables of a class quite different from anything hitherto obtainable in this country and in a new way that dispenses with ordinary cable-making machinery. This "Pyrotenax" cable was fully described in our last issue.

All the plant employed by Pyrotenax, Ltd., is of British manufacture, the furnaces and power drives being all-electric. The insulation is magnesia, pressed from powder into blocks complete with holes for the conductor rods. Moisture is removed by heating the blocks in a rotary hearth electric furnace. The magnesia blocks are then inserted into a copper tube, previously cleaned and dried internally, while being

water cooled externally. An inert gas flows through the tube from the opposite end to prevent interior oxidisation during the hot filling.

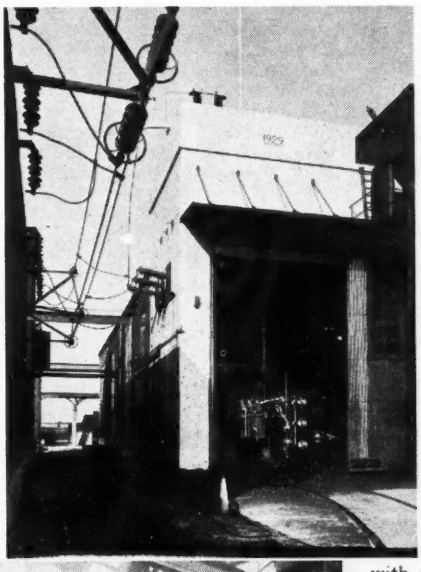
The coiled copper conductor rods are next straightened and threaded through the pre-formed holes in the magnesia blocks. The whole tube is then drawn through a die on a "straight" bench to three times its original length, followed by continuous annealing in a neutral gas through an electric muffle furnace with a water-cooled outlet. This softens the copper prior to further drawing-down on large- and small-diameter bull-block drums, and coil annealing in an electric bell furnace with one container for heating, while the other two are being cooled or recharged.

The drawing-down processes compress the magnesia blocks into a continuous mass of insulation, which is unaffected by heat, and final annealing softens the copper for easy installation. Tests are applied in accordance with standard specifications, and the cable is despatched in hessian wrapped coils, not wound on drums.

Messrs. Gregory & Partners, Newcastle, were the factory consultants. The furnaces were supplied by the Electric Resistance Furnace Co., Ltd. The bull-blocks, by Messrs. Barron & Crowther, of Preston, have 3 ft. and 6 ft. drums, the larger being twice the diameter of any other in this country. The 25-ton insulation press was supplied by John Shaw & Sons, Salford, and another of 60 tons is now being completed.

Viscount Ridley formally declared the new cable factory open on October 12. Sir Brograve C. Beauchamp, M.P., chairman, presided at luncheon, and Mr. H. W. Clothier and other directors were present. Sir Arthur H. L. Wood, chairman of the board, presided at dinner in the evening.

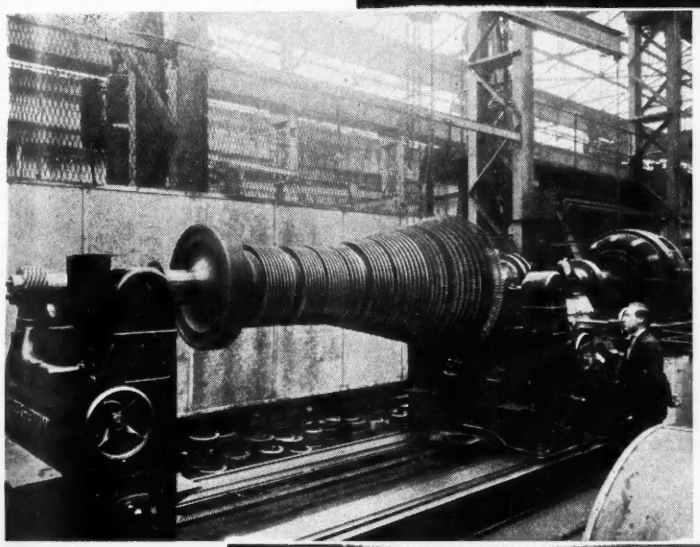
The formation of the Parolle Electrical Plant Co., Ltd., represented a co-ordinating effort to facilitate the supply from one source (Reyrolle-Holmes-Parsons) of complete power- and sub-station main and auxiliary equipment. Mr. F. G. H. Bedford, chairman and managing director of C. A. Parsons & Co., Ltd., was the host at luncheon on the second day, devoted to a tour of the Heaton group of works, which occupy 25 acres and have a pay-roll personnel of 2,800.



Several lathes were dealing with work up to 14 ft. in diameter, one of them turning the shaft for a 25-50 cycle frequency changer of 25,000 kVA for the White Bay power station, Sydney, N.S.W. One plano-milling machine has a horizontal traverse of 15 ft. and a vertical traverse of 10 ft. Another planer for completely assembled bedplates and cylinders will take work up to 12 ft. 6 in. wide, 12 ft. high and 29 ft. long; it is driven by a 60 h.p. motor with feeds and traverse operated by a separate 9 h.p. motor under push-button control from several positions.

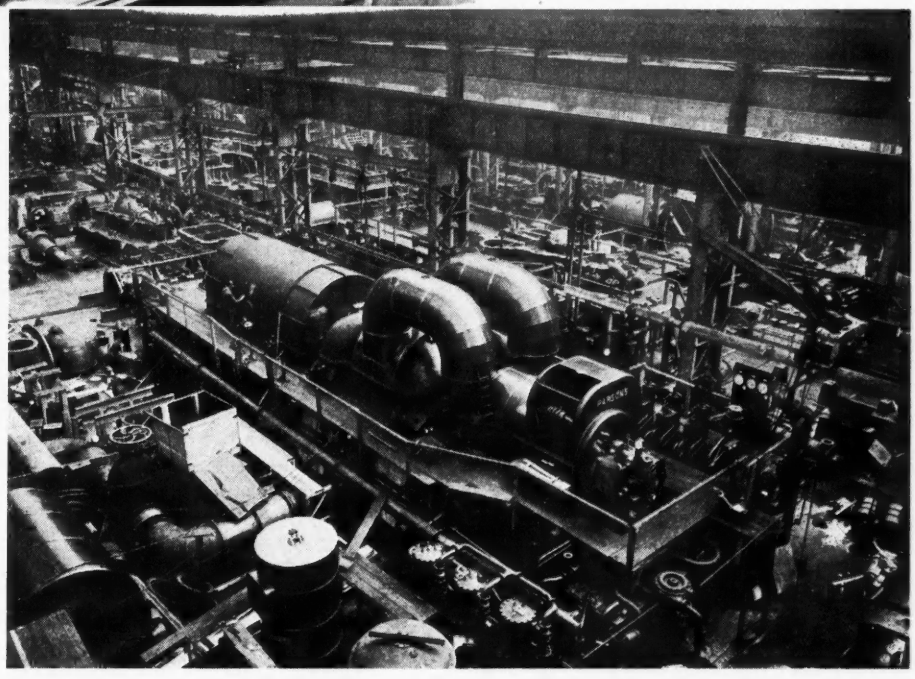
Gear wheels are cut on the "creep" system; forgings are trepanned for "borescope" internal examination; and the dynamic balance of rotors is verified at all speeds on a Schenck machine. One of two drying-out and impregnating chambers is 16 ft. in diameter and 18 ft. long, steam heated to 190 deg. F. with 26 in. of vacuum available. In a concrete L-shaped chamber 40 per cent. overspeed tests are carried out with motor drives, under observation and control from a separate room.

Above the materials test house are chemical laboratories. Besides the high-voltage Schering bridge in the electrical research laboratory a second portable bridge of the same type is used in the works for testing the insulation



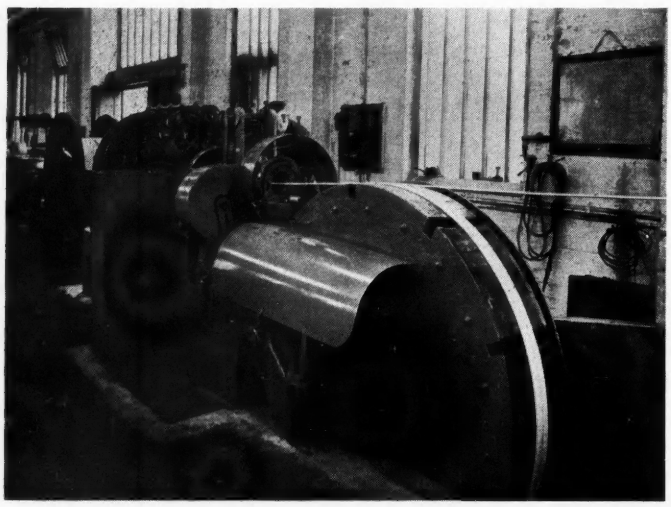
Above: Short-circuit test bay. Left: Turbine spindle in dynamic balancing machine. Below: A 40,000-kW Parsons turbo-alternator on test

of complete alternators, stators and transformers, which can also be taken into the high-voltage laboratory without removal from railway trucks. Two 50-kVA transformers in series provide 750,000 V at normal frequency, and a Parsons-made impulse generator for 500,000 V consists of a nine-stage condenser bank, each of 0.25 μF, charged in parallel to



70 kV d.c. by a rectifier connected to a high-voltage transformer. Within a magnetic screen is a high-speed recording oscillograph of the Cambridge-Finch cold-cathode type specially designed for impulse testing work.

Among work seen in progress was one of two 18,750 kW turbo-alternators for the Broken Hill Proprietary Co., Australia; a repeat 1,500 kW d.c. geared set for Kodak, Ltd., Wealdstone; a 1,500 kW double pass-out geared turbo-alternator for Alders (Tamworth), Ltd., Staffs.; h.p. and l.p. cylinders for the first of two 30,000-kW, 33-kV turbo-alternators for the Calcutta Electric Supply Co. in process of blading; surface condensing plant for Congella, S.A., forming part of an order for a 30,000-kW, 34-kV set; a 50,000-kW 20-kV machine for Dalmarnock, Glasgow, similar to the set recently installed there; and two 40,000-kW 33-kV turbo-alternators for Table Bay, Capetown, one of which was being packed for shipment.



Cable-making machine at Parsons' works

More than one-third of Parsons's output goes abroad, apart from an important trade in turbine blading with licencees and other manufacturers in all parts of the world. Blades are rolled integral with their root pieces, involving drawing, heat treatment and machining. Others are made in segmental fashion by cutting up the strip, forming, welding, brazing and serrating the segments. Hollow blades have an iron core, which is dissolved out with acid.

Stator conductors are insulated with mica flakes bonded into sheets with varnish that remains flexible, and wrapped round the conductors by machines before drying and impregnation in steam-heated vacuum ovens. Double and triple concentric conductors which distinguish Parsons high-voltage alternators are in the form of machine-made cables, each strand of copper wire being separately insulated with asbestos or cotton covering. The manufacture of micanite mouldings is also undertaken in the insulating shop.

Air-cleaning and ventilating plant has been installed to ensure cleanliness in the coil winding shop. Additions are being made to the transformer shops, a speciality being automatic voltage regulators operating on the mid-point reactor system.

The switches are mounted in circular formation on bakelite panels which divide the tank into three-phase compartments. They are cam-actuated with a common spindle operated by a patent pendulum device, raised by a motor for initiation, and in falling ensuring completion of the tap change. Mercury switches are employed, and the automatic relay has no moving parts, consisting of combined condensers and chokes that cause an abrupt change of current at a critical voltage.

Transformer tanks are welded at the Walker Gate Works, which can fabricate plates up to 4 in. thick with the aid of machines for drilling, shearing, bending, folding and automatic coal-gas flame cutting; 24 single-operator welding sets are in regular use, of which 17 are motor-generator sets.

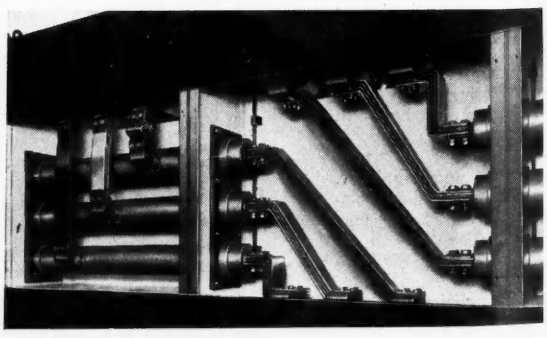
Castings up to 15 tons have been made in the foundry, where the loam moulds are made in pits with cast-iron sides embedded in concrete. Some of the electrical castings are of metal only one-eighth of an inch thick, and nickel alloy non-magnetic castings are also made. There are two melting cupolas each of 4 tons per hour capacity, and one for 2 tons per hour was installed last year. This is of the balanced blast type and has shown 30 per cent. fuel economy by pre-heating the charge. In the brass foundry casting is done vertically up to 20 ft. finished length, while the pattern shop machinery is driven by shafting below the floor.

The mirror department makes curved reflectors for searchlights, lighthouses and cinematography, and Sir Howard Grubb Parsons Co., Ltd. (an associated company), has under construction a large telescope for the Radcliffe Observatory in South Africa, all movements being motor driven under remote electrical control. The moving parts weigh 35 tons, necessitating delicate and highly accurate driving mechanism. The 74-in. mirror of the Toronto reflecting telescope, which is the largest in the British Empire and the largest but one in the world, was recently ground in this works.

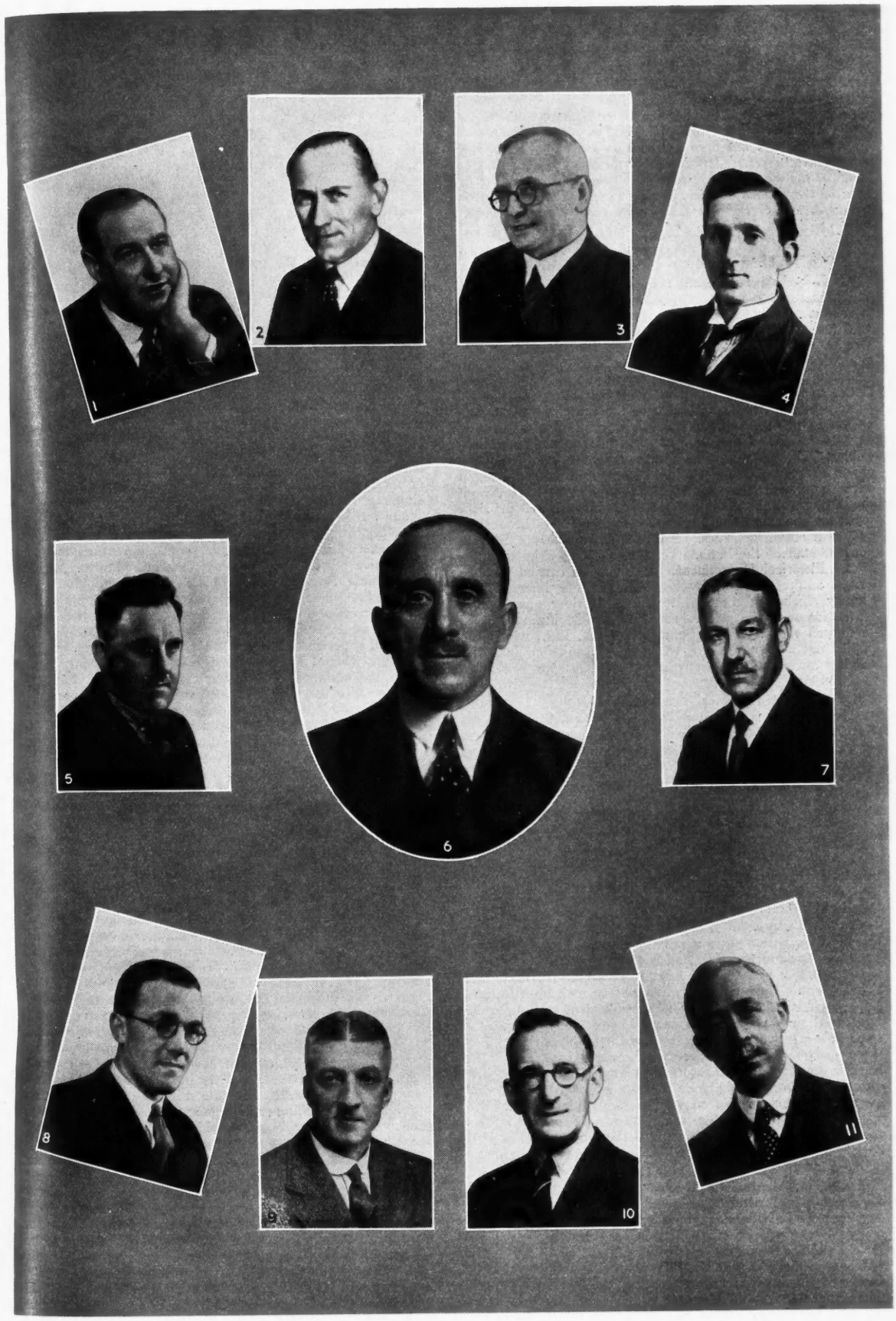
Heavy Current Switchboard for a Gold Mine

HEAVY current switchgear for use on medium voltage a.c. systems must have bus-bars arranged in such a way that losses are reduced to the minimum so that over-heating is avoided. In this connection the arrangement adopted in the design of a twenty-panel truck cubicle switchboard recently suplied to the Welgedacht Exploration Company, Ltd., of South Africa, by the General Electric Co., Ltd., for installation in the No. 2 shaft sub-station of the Witwatersrand gold mining area is of interest. The switchboard is intended to operate at 2,200 V, three-phase, 50-cycles at an altitude of 6,000 ft. above sea level, and consequently the clearances between the three phases and between each phase and earth have been increased to correspond with those usually allowed for 3,300-V gear. The capacity of the bus-bars is 4,000 A and tubular conductors have been employed in view of the small space available and the impossibility of providing a conventional laminated bus-bar which will comply with the B.S.I. rules as regards temperature rise. This follows from the fact that when more than about four laminations are used to carry a.c. there is very uneven distribution of current across the section. In addition, the power factor of the current in the inside laminations is low, and the small conductor phase spacing makes it practically impossible to carry more than about 3,000 A however many laminations are used in the conductor. On the other hand, a tubular conductor has a low skin effect and the material is disposed around the circumference where the current tends to flow. These bus-bars are supported at each cubicle division where they pass through bakelite bonded paper-board bushings. The supports are designed to allow the bus to move freely when expanding and contracting, the short stiff connections which are tapped from the bus-bars being provided with flexible joints. Ordinary copper strip conductors are used, however, for the individual cubicle connections, where the maximum capacity is only 2,000 A.

Mechanical withdrawing and closing mechanism is provided on each truck. The plug contacts are of the line contact controller pattern, and the actual contact segments are silver-plated. Should any oxide form, due to high temperatures during overloads, it will remain a conductor whereas copper oxide is an insulator. Furthermore, silver oxide has a negative temperature coefficient, which limits the amount of generated heat, as the resistance between the contacts decreases with increase in temperature.



Rear view of part of the switchboard showing the 4,000-A tubular bus-bars. The cubicle on the right is one of the bus section compartments and has a capacity of 2,000 A



The President and Chairmen of the Institution of Electrical Engineers for the 1937-38 Session

(See next page)

1. Mr. H. Cobden Turner (Meter and Instrument Section). 2. Mr. J. L. Eve (Transmission Section). 3. Mr. T. Wadsworth (Wireless Section). 4. Mr. J. W. Thomas (North-Western Centre). 5. Capt. H. Hooper (South Midland Centre). 6. Sir George Lee (President). 7. Mr. G. K. Paton (Mersey and North Wales (Liverpool) Centre). 8. Mr. W. D. Horsley (North Eastern Centre. 9. Mr. H. G. Weaver (Western Centre). 10 Mr. J. G. Craven (North Midland Centre). 11. Lt.-Col. K. E. Edgeworth (Irish Centre). (*Photographs*: 1, *Lafayette*; 2, 4, 6 and 7, *Elliott and Fry*; 5, *H. J. Whitlock and Sons*; 9, *R. Burnicle, Newport, Mon.*; 10, *Charles, Leeds*; 11, *Werner and Son, Dublin*).

The New I.E.E. Chairmen

A variety of experience

The London Session of the INSTITUTION OF ELECTRICAL ENGINEERS *opened yesterday (Thursday) evening, when Sir George Lee, the president, was to deliver his inaugural address, while a number of the local centres had previously begun their proceedings. As has been our custom for many years past, we present to our readers the portraits and brief biographical notes of the men who will preside during the session as chairmen of the various Centres, as well as of the chairmen of the Transmission, Meter and Instrument and Wireless Sections.*

A BRIEF account of the career of **Lt.-Col. Sir George Lee,** engineer-in-chief of the General Post Office, appeared in THE ELECTRICAL REVIEW for June 4th, 1937.

Mr. J. L. Eve, TRANSMISSION SECTION, became a pupil with the Folkestone Electric Supply Co. in 1904, and two years later was appointed assistant engineer to the company. In 1908 he joined the High Wycombe Electric Light & Power Co. as station engineer, and in the following year was appointed assistant engineer to the Surbiton & District Supply Co., which he left in the same year to join R. W. Blackwell & Co. as assistant engineer on the construction of overhead equipment for the electrification of the south suburban lines of the London, Brighton & South Coast Railway. In May of 1914 he joined the staff of British Insulated & Helsby Cables, Ltd., and went to Australia, where he carried out the erection of the overhead equipment and transmission lines in connection with the electrification of about 400 miles of the Victoria Railways. He returned to England in 1923, when he was engaged on work in connection with h.v. cables and distribution schemes. He left B.I. Cables in 1925 to join the staff of the Foundation Co., Ltd., as chief engineer of the Electrical Department, for whom he carried out the design and erection of various transmission lines in this country, including some of the Scottish river crossings in connection with the grid scheme. At the beginning of 1930 he formed the J. L. Eve Construction Co., Ltd., which has carried out a great deal of work on transmission lines and wireless towers on the electrical side, and bridges, buildings, roads, sewers and a hydro-electric pipeline on the civil side.

Mr. H. Cobden Turner, METER AND INSTRUMENT SECTION, was educated at Manchester Grammar School, Salford Royal Technical College, and the Manchester College of Technology, where he was awarded a diploma in electrical engineering and mechanical engineering. He obtained his works experience at the Peel Works, Salford, of the General Electric Co., Ltd., and the Test Room & Research Department of Ferranti, Ltd. From there he went to the Electrical Apparatus Co., to found its Meter Department, and he designed its first a.c. meter. He obtained sales experience with the British Westinghouse E. & M. Co. (now Metropolitan-Vickers). He is at present general manager of Salford Electrical Instruments, Ltd., a director of the British Ferrocart Co., Ltd., and governor of the Royal Technical College, Salford.

Mr. T. Wadsworth, M.Sc., M.I.E.E., WIRELESS SECTION, has been for many years a prominent official of the British Thomson-Houston Co., Ltd., at Rugby, devoting his energies to the Research Laboratory. After receiving his early training at Manchester University, Mr. Wadsworth took up a lectureship in electrical engineering at the Woolwich Polytechnic. He served in the Royal Engineers during the War, and for some time afterwards he was Head of the Electrical Engineering Department at the Coventry Technical Institute. His work in the Research Laboratory at Rugby has brought him into contact with a wide circle of those interested in technical matters, and his services on various I.E.E. and E.R.A. committees have also made him a well-known figure in the electrical world. He was president of the Rugby Engineering Society in 1934. Mr. Wadsworth is a much travelled man, and includes mountain climbing in his leisure pursuits.

Mr. J. W. Thomas, NORTH WESTERN CENTRE, was educated at Manchester Central School, and completed a three years' day course in electrical engineering at the College of Technology (Victoria University), Manchester, receiving a diploma in electrical engineering, and the degree of B.Sc. Tech. (honours division). For three years he was a student apprentice in the Manchester Corporation Electricity Department under Dr. S. L. Pearce. He subsequently gained experience as charge engineer in the Stretford Electricity Works and as an engineer in the Test Bed, Magnetic and Meter Departments of the Metropolitan-Vickers Electrical Co., Ltd. He was lecturer in electrical engineering at Birmingham Technical College for one year, and from 1920-30 was assistant general secretary of the Electrical Power Engineers' Association and technical editor of the *Electrical Power Engineer.* In 1926 he took the degree of LL.B. at Victoria University, and in the following year was called to the Bar (Middle Temple). Since 1930 he has been in practice as a barrister on the Northern Circuit, specialising in electricity supply, compensation, &c. From 1929-1933 Mr. Thomas was hon. secretary of the North Western Centre of the I.E.E., and since 1934 has been a member of the Council. He has been a frequent contributor to the ELECTRICAL REVIEW of articles dealing with the legal aspects of the electrical industry.

Mr. W. D. Horsley, NORTH EASTERN CENTRE, received his practical training with C. A. Parsons & Co., Ltd. His connection with this company has been continuous from apprenticeship to the present time, with the exception of a period with the Royal Air Force as a pilot in a bombing squadron in 1918. He was awarded the John Hopkinson Premium for his paper on "The Stability Characteristics of Alternators and of Large Interconnected Systems," which was read before the Institution in 1935. He has had a wide experience in the design, construction, testing and installation of some of the largest turbo-type alternators. He has been associated with the development of the high-voltage alternator which his company pioneered, and he now holds the position of chief electrical design engineer. Mr. Horsley has always taken an active part in the affairs of the Institution in the North-Eastern Centre since 1919. He was a member of the students' committee and its chairman during the first years of its revival after the war. He has recently returned to England from a visit to India on behalf of his company.

Capt. H. Hooper, SOUTH MIDLAND CENTRE, has been hon. secretary of that Centre for the past seventeen years. He commenced his career with five years' apprenticeship in the locomotive shops of the then Midland Railway at the Mechanical Engineering Dept., Saltley, Birmingham. On joining the Birmingham Corporation Electric Supply Department, experience in charge of showrooms and advising consumers on lighting and power schemes was followed by practical experience at Dale End sub-station, Birmingham, in the days when 1,500 kW rotary convertors were large units. Upon the outbreak of war Capt. Hooper joined the Royal Engineers, served with the 46th Division in France, and later in the R.A.F. He was twice wounded and was mentioned in dispatches. After the war he was for nine years sales and contracts manager of Veritys, Ltd., and since 1929 has been on the staff of the Central Electricity Board, being assistant to Mr. S. T. Allen, manager, Central England Area. Capt. Hooper is also president of the Birmingham Electric Club. He is interested in every kind of sport and also in the work of the Birmingham hospitals. The Council of the I.E.E. has accepted the invitation of the South Midland Centre to hold next year's Summer Meeting in the Midlands.

Mr. J. G. Craven, NORTH MIDLAND CENTRE, was apprenticed to Greenwood & Batley, Ltd., in the Electrical Department, and in 1907 he joined the Newcastle Electric Supply Co., Ltd., as junior assistant engineer, becoming successively shift engineer, Blaydon power station, assistant engineer (Protection Gear Department), and assistant district superintendent, Cullercoats district. He returned to Greenwood & Batley, Ltd., in 1912, as chief of the Electrical Testing Department, and in the following year was appointed assistant manager of the Electrical Department. From 1919 to date he has been a director of Green & Smith, Ltd., incorporating Wallis & Watson, Leeds, electrical engineers and contractors. Among the recent contracts for which he has been personally responsible are the chemistry block of the University of Leeds, comprising seven separate installations, the electrical distribution, including running and connecting of all p.i. lead-covered armoured mains cables from the sub-station at the University to the various departments, and the erection and connecting up of the main switchboards. He was also responsible for the lighting, power and technical wiring of B.B.C. Broadcasting House, Leeds, comprising nine separate installations.

Mr. G. K. Paton, MERSEY AND NORTH WALES (LIVERPOOL) CENTRE, has been connected with the North Wales Power Co., Ltd., since it commenced operations in 1906. A native of Dumbarton, he received his early education at Dumbarton Academy and later at Heriot Watt College, Edinburgh. He joined Bruce Peebles & Co., Ltd., in 1898, at their original Tay Works, Leith, later at East Pilton, Edinburgh, where after considerable experience in the various works departments he had charge of the Test Department. It was during this period that Bruce Peebles & Co. produced the first synchronous motor convertor to the designs of Mr. J. L.La Cour. Following a period on contract work he was responsible for the starting up of the original hydro-electric scheme in North Wales in 1906. He joined the North Wales Power & Traction Co., Ltd.,

at the end of 1907 as chief engineer, and in 1918 held the additional appointment of electrical engineer to the Aluminium Corporation, Ltd., at Dolgarrog. Since 1923 considerable developments have been carried out in North Wales under the North Wales and South Cheshire Electricity District Order, 1923, and in conjunction with Sir Douglas Fox & Partners, the consulting engineers, Mr. Paton was responsible for the carrying out of the technical scheme approved by the Electricity Commissioners, including the new hydro electric station at Maentwrog, which has now an installed capacity of 24,000 kW. The hydro-electric stations in North Wales are now capable of an output of over 100,000,000 kWh per annum with an installed plant capacity of 46,000 kW. With the formation of British Power & Light Corporation, Ltd., in 1929, the holding company which controls the North Wales Power Co.. and Electricity Distribution of North Wales and District, Ltd., considerable expansion of the development work has taken place throughout the whole of the North Wales area. Mr. Paton is the resident director and engineer and manager responsible for the development which has taken place. He is an associate member A.I.E.E., member of the Consultative Committee of the Central Electricity Board for North West England and North Wales, and a representative of the North Wales Power Co., on the Joint Electricity Authority for North Wales and South Cheshire.

Mr. H. G. Weaver, Western Centre, was educated at Shrewsbury and at Wolverhampton Technical College and served his apprenticeship with the Electric Construction Co., Ltd., Wolverhampton. Subsequently for four years he was engineer-surveyor for South Wales and the West of England for the British Engine, Boiler and Electrical Insurance Co., Ltd. Since 1913 he has been engineer and works manager to the Whitehead Iron & Steel Co., Ltd., of South Wales.

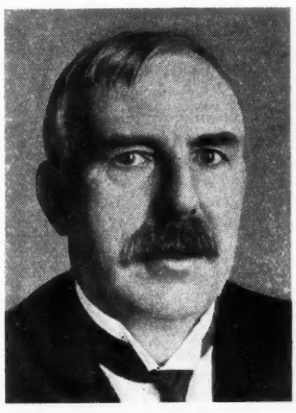
Lt.-Col. K. E. Edgeworth, Irish Centre, was educated at Marlborough and the Royal Military Academy, Woolwich, where he gained the Pollock Medal and prizes for mathematics and chemistry. He entered the Royal Engineers in 1898, becoming lt.-colonel in 1920. He served in South Africa (1900-2), East Africa (1903-4), and the Sudan. During the European war he was three times mentioned in dispatches and was awarded the D.S.O. and M.C. (three medals). In 1923 and 1924 he was Chief Experimental Officer at the Signals Experimental Establishment at Woolwich, the work consisting chiefly of the design of wireless sets for the army. He was placed on retired pay in 1926. For four years (1927-30) Lt.-Col. Edgeworth was chief engineer to the Sudan Posts & Telegraphs Department in Khartoum, and since his return home in 1931 he has written several books and articles on economics. While he was on half-pay in 1925 he did some experimental work on the frequency variations in triode oscillators, and also read a paper on the subject before the I.E.E.

Major H. Bell, O.B.E., T.D., Scottish Centre, is general manager of the Glasgow Corporation Electricity Department, having succeeded Mr. R. B. Mitchell in this position in 1928. Previous to going to Glasgow he had been engineer and manager of the Hull Corporation electricity undertaking, exclusive of his army service during the War, for twenty years. He has had considerable electrical experience in dock and railway development, being responsible, in conjunction with the dock engineer of that period, for the complete electrification of the King George Dock of the London & North Eastern Railway Co. He has also had experience of contemporary electrical practice in other countries, notably in Canada and America.

The Late Lord Rutherford

WITH great regret we record the death of Lord Rutherford of Nelson, after an operation on Tuesday last. He was 66 years of age and from his youth had been engaged in the study of physics with most fruitful results.

Ernest Rutherford was born in New Zealand, near the town from which he took his title; his father was a farmer. His experimental ability was manifested early in life and from a State primary school he proceeded by way of scholarships to a secondary school and to Christchurch University. In 1894 he was awarded an 1851 Exhibition scholarship which brought him to England, where he joined J. J. Thomson at Cambridge. Four years later he became Professor of Physics at McGill University, Montreal, and in 1907 came back to England to occupy the Langworthy Chair of Physics at Manchester University. He returned to Cambridge in 1907 to become Cavendish Professor of Experimental Physics in succession to J. J. Thomson, whom he once more followed (in 1927) when he was appointed Professor of Natural Philosophy at the Royal Institution.



[Press Portrait Bureau
The late Lord Rutherford

Rutherford's earliest work was the study of electric waves and he invented a detector that was capable of receiving signals over a greater distance than any existing detector, the principle of which was based on the demagnetising of thin wires by electrical oscillations. He also carried out researches on the velocity of ions in gases, to which gaseous conductivity is due. He began his researches into radio-activity by an extensive series of investigations into the radiations from uranium and demonstrated the existence and nature of the emanations and of the radio-active deposits and clearly separated the radiations into α, β and γ rays. He showed, by means of strong magnetic fields, that the α rays were positively charged particles, which he later showed to be helium atoms; a method was devised of counting these. Going on from this point he interpreted further results as showing that the atom consisted of a positively charged nucleus surrounded by a number of "electrons" in a "sun and planet" formation.

At the Cavendish Laboratory he directed his attention to the breaking up of the nucleus by utilising the intense local concentration of energy offered by the α particle. By passing α particles through atoms of nitrogen, he showed that hydrogen could be obtained from nitrogen as a result of the disintegration of the nucleus; similar results were afterwards obtained with other atoms. It was Rutherford's method of dealing with individual atoms that enabled the exceedingly small quantities of hydrogen to be detected.

Thus was demonstrated the truth of the hypothesis he had put forward first in Montreal that transmutation of the elements was possible, and, indeed, was continuously taking place spontaneously in the case of radio-active substances. In other words, radio-activity was found to be the result of atomic explosions. In some cases the atom was split into two, one part having the characteristics of helium and the other of a rare gas. The latter, originally known as "the emanation" exploded in turn after a few days, being despatched to new surfaces on which the residue could sometimes be retained.

It was by working from these results that Rutherford when at Manchester was able to enunciate the second important hypothesis of the "planetary" motion of the electrons about the nucleus to which reference has been made above. He had found that the two derived atoms were shot through any kind of surroundings in almost straight lines normally without any deviation when other atoms were encountered, proving their non-solid nature. The existence of a "sun" at the core, however, was a necessary corollary to the occasional violent deflection of the helium constituent of the disrupted atom from its straight path. The implication was that the positive nucleus included nearly all the mass but was itself of minute volume, comparatively speaking.

These deductions, supported as they were by numberless practical demonstrations, may be regarded as an essential preliminary to the experiments made recently by several workers in the artificial disintegration of the atom.

Caring little for personal recognition in his devotion to science, he nevertheless met with appreciation throughout the world. In this country official recognition of his contributions to the advancement of science was conferred on him by a knighthood in 1914, by the Order of Merit in 1925 and by elevation to the peerage in 1931 as Baron Rutherford of Nelson. The Royal Society (of which he was president from 1925 to 1930) awarded him the Rumford Medal in 1905 and the Copley Medal in 1922. From the Institution of Electrical Engineers he received, in 1930, the highest distinction within its bestowal—the Faraday Medal.

He was able to find time to play his part in disseminating scientific knowledge in journals and in the proceedings of societies and also to serve during his career on a number of Government Committees and to become (in 1930) chairman of the Council of the Department of Scientific and Industrial Research.

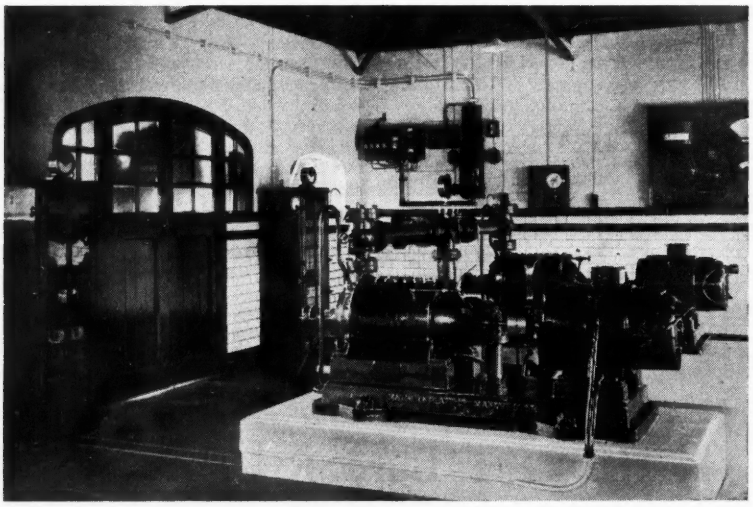
Automatic Pump Control

Methods of operation of different systems

By F. Johnstone Taylor

THERE has been a great change during the last decade in the conception of the most reliable and efficient pumping machinery. It is doubtful if the large steam sets associated with waterworks pumping will ever again be constructed; for similar duties an electrically driven set can now show very nearly the same efficiency and cost about 75 per cent. less to install. Power supply is reliable and, with automatic control, labour charges are insignificant. The centrifugal or turbine pump of to-day is equal to practically any duty formerly associated with reciprocating pumps and its speed can be adjusted to the synchronous speed of any direct-coupled a.c. motor.

In an earlier article I pointed out that many installations can be so arranged with gravity suction that the set can be put on to and taken off the line automatically by a simple float switch, and, when this simple form of self-priming is impracticable, the pump can be charged by an automatically controlled vacuum pump which comes into operation first. An even better arrangement, perhaps, is where the pumps are built with a rotary hydraulic ejector. In this, the Jennings system, the main pump of the end-suction class is started and stopped in the usual manner by a float switch, but as soon as it commences running the vacuum pump, which is connected to an independent supply of clean water such as the public mains, primes the pump and, this done, a float valve in the "suction controller" unloads it, though it will come into action again if the main pump should lose its prime.



Automatically controlled booster pumps at the Kinver station of the South Staffordshire Waterworks Co.

Such disadvantages as a float switch possesses are overcome in the Evershed & Vignoles "No-Flote" system, which consists of two adjustable level rods passing through insulators and held in clamps. Cables connect the rods to a precision relay which opens and closes a small switch of an automatic starter. A small transformer reduces the mains voltage for the operating equipment. When the liquid reaches the upper rod level the set starts, and it stops when the level falls below the end of the lower level rod.

Many pumps, as in drainage and sewage pumping, are not required to pump down to a predetermined suction level. For water supply it is usually a matter of pumping up the level of a reservoir or tank, the pumps being sufficiently near the tank to be put into and out of operation if the controller is coupled to a mechanical depth gauge, when the working is much the same as that of a float switch, always provided that the pump is self-priming. When the pumps are some distance from the reservoir electrical transmission of the water level has to be made to the power house. By adapting the distance-level recorder to putting the pump in and out of action there is no practical limit to the distance over which such sets can be entirely automatically controlled as protective relays can be installed to shut down the set under such conditions as a hot bearing, choked suction or fractured delivery pipe.

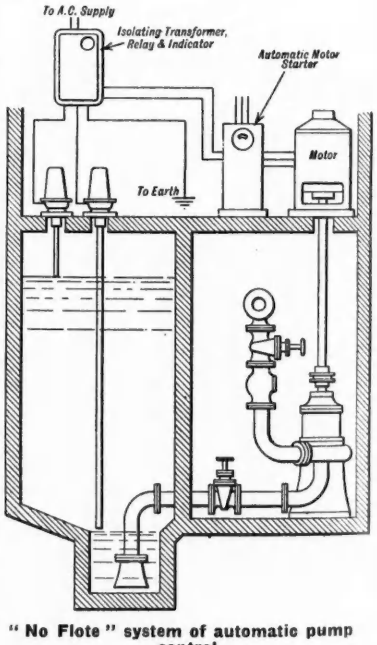
A typical automatically controlled waterworks pumping set is that installed by Mather & Platt at the Kinver pumping station of the South Staffordshire waterworks for boosting purposes, in which case the rise and fall of the pressure in the mains is applied at the pump house to stopping and starting the pumps by means of Brookhirst gear. The system of control embodies the Evershed-Midworth water-level recording and transmitting system. Although the pumps are started and stopped automatically according to the demand upon the reservoir they can be controlled from a second station at Prestwood, five miles away, where signal lamps show the water level in the Kinver reservoir or indicate a failure of power supply there.

In an emergency, such as the bursting of the delivery main, the pumps at Kinver can be shut down immediately from the Prestwood station, and they can be similarly brought into operation again, if the "all clear" signal be given, by an emergency switch. The whole of these controls and indications is effected over one pair of pilot lines rented from the G.P.O. between the reservoir and Kinver and two pairs of lines between the two pumping stations.

In borehole pumping it may be required to stop the pumps when a certain level of draw down has been reached. The depth, which may reach 300 to 400 ft., and the limited clearance between the bore and the rising pipe in it may preclude the use of mechanical float gear. If the level is indicated electrically by means of the Marchment-Needham automatic plumb-bob level indicator the same system can be applied to stopping the pump either at a predetermined level of draw down or at a point which will prevent the pump suction being uncovered.

In pumping up the level in a distant reservoir it may not be necessary with small sets to go to the expense of a distant level recorder. The rising of the water, by increasing the pressure in the rising main, can control the pumps through an altitude gauge. In another system the pump is started by a single pole time-switch with automatic current release, and continues to deliver water until the reservoir is full, when a float valve closes the delivery pipe and the main switch is opened by means of the minimum current release.

In one instance a set is controlled by an overflow pipe from the high-level reservoir to the pump station (Sulzer system). When the reservoir has been pumped up to a predetermined level the water flows through this pipe and fills an air vessel to a certain height, when a switching vessel connected to the air chamber tips the float switch, cutting off the electricity. On the air vessel is a drip cock fitted with a fine-threaded screw which discharges into the funnel. When the water in the air chamber has slowly run out through this drip cock, so that the switching vessels controlling the main switch are empty, the counterweight on the latter closes it again and the pumps are automatically started by the motor self-starters.



"No Flote" system of automatic pump control

For supplying city buildings from boreholes the water can be pumped into a closed tank and stored there under controlled air pressure. As soon as the pressure falls the pump is started, and *vice versa*, the float switch then becoming a pressure switch. This class of pump, which is a development of the last twenty years, functions quite well at depths of upward of 300 ft., but is relatively costly on account of the long shaft and the accurate machining and fitting of the sections of the rising pipe which hold the steady bearings for the shaft, and on account of the need to bring the pump to the surface for repairs. The use of a submarine motor obviates this difficulty.

Most of this equipment is associated with relatively small units that require only occasional supervision. Generally, with large units, an attendant will be on duty, even though the control is wholly automatic, and, again, while the usual run of electrical protective equipment is now perfectly reliable, pumping any appreciable volume of water to high heads with electrically driven centrifugals introduces a risk that if the pump is suddenly stopped one of two things happen. Unless the check valve has been adjusted to the specific conditions it may slam on its seat and cause a dangerous rise of pressure, or if there is no check valve a sudden back flow of water may reverse the motor due to the pump functioning as a turbine, causing dangerous vacuum and surges in the pipe line. For meeting these conditions Blakeborough's have developed plunger valves which function as both check and stop valves.

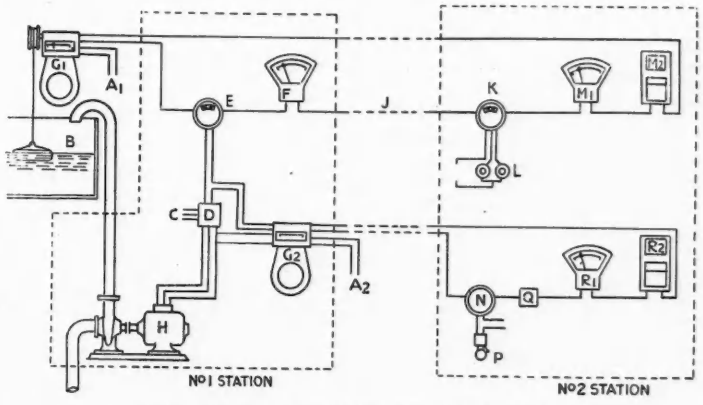
Supervisory Control

Considerable capital expenditure on gravitational sewage systems with central pumping stations may be avoided by dealing with the sewage locally by small self-contained sets controlled from a central board. The initial control at the pumps, which can be compactly installed in underground chambers, is a float switch. Even when the volume of sewage in storms exceeds the dry weather flow, this can be easily provided for by duplicating, triplicating or even quadrupling the units and causing them to cut in successively as the liquid level in the pump rises.

Centralised control of local pumping units is well exemplified by the twenty-four Metropolitan-Vickers sets used for the main drainage scheme of Georgetown, British Guiana. These stations all operate automatically on float switch control, the motors aggregating 808 h.p., ranging in output from 9½ to 25 h.p. They are all of the squirrel-cage type, star delta started, and are supplied at 200 V from a 4,000-V ring main through pole-mounted transformers. A second unit comes into operation under storm conditions, which are indicated by visible and audible alarms at the central control desk.

The waterworks pumping station of this town contains main pumps driven by synchronous-induction motors of 90, 125, 165 and 200 h.p. with a standby Diesel set. There is no storage, the pumps delivering direct into the mains. When the demand for water rises or falls sufficiently to affect the pressure to the upper or lower limit of the pressure range visible and audible alarm is given. In such cases when changing over pumps the motor is synchronised automatically and a pilot lamp indicates that the discharge valve should be opened. The sluice valve can be operated by push-button control, the valve motor acquiring momentum before being connected with the valve motion so as to "crack" it open without stalling.

If a combined reflux and check valve of the hydraulically operated plunger type is used the pressure created when the pump is run up to speed opens the valve. When the pump is stopped the release of pressure will cause the valve to close slowly under "cataract" control.



Automatic pump control at the Kinver station

A$_1$, A$_2$, d.c. supply. B, Kinver reservoir. C, three-phase a.c. supply. D, auto-starter. E, pump relay. F, reservoir level indicator. G$_1$, G$_2$, Evershed-Midworth transmitters. H, pump at Kinver (No. 1 station). J, Post Office lines. K, signal relay. L, high and low level indicating lamps. M$_1$, R$_1$, reservoir level indicators, and M$_2$, R$_2$, recorders. N, P, alarm relay and bell. Q, emergency switch.

With any pump operated by a constant-speed motor which cannot be slowed down prior to stopping protection against pressure surges in the pipe line is important. The controlled plunger valve system is one of several means of preventing that condition.

Another condition to be guarded against is sudden drop of pressure in the rising main; as this is liable to overload the motor the latter should be liberally rated. Saving in first cost and running cost may sometimes be made by installing a spring-loaded valve such as the "Pumreg" by Holden and Brooke, which functions as a governor held open by the delivery pressure of the pump, but closes when the pressure falls. It acts in the same way as the plunger type of check valve, except that its simplicity makes it better suited generally to smaller units. It acts, too, as a sensitive and fully automatic reflux valve and generally eliminates the necessity for a hand-operated stop valve.

The Recovery of Iodine. By C. C. Downie

IN response to the increased demand for iodine and iodine products by the pharmaceutical trades, the extraction of the element has undergone many practical changes. The process of kelp burning for ultimate iodine recovery has long been criticised because of the volatilisation losses sustained when the selected seaweed is exposed to slow combustion. About ten years ago an American process was thought likely to obviate the earlier kelp burning, but it involved the use of a vast number of tanks for efficiently dealing with the bulky loose seaweed. In this country the modern electrostatic recovery process seems to promise further development.

In earlier methods most of the weak liquors or solid waste products were suitably dealt with, but the gaseous matter which is continually evolved during the initial burning was not always taken into account. In many instances, there has been no means of recording such losses, and the usual practice was simply to be content with what recovery is made. The recovery of the gaseous constituents applies only where the kelp is originally burned, and where considerable tonnages are handled annually.

It is a common misconception that the rich odour which is emitted from kelp during this burning process cannot be recovered as it more or less represents a gas.

Various methods were previously attempted to recover the fine iodine particles that cause the odour by methods similar to those adopted for dust recovery, *i.e.*, cyclone collectors, condensers and bag-houses, but with the exception of the water-cylinder, these were of little practical value. Efforts were also made to alter the physical condition of the evolved gaseous matter as it escaped from the seaweed, in order to give the particles the opportunity to separate out, but these also met with little success.

The introduction of the electrostatic precipitator, however, proved conclusively that all dissipated iodine and iodine salts could be reclaimed in perfect condition. Hence the working of the kelp in this country, which was thought likely to be surpassed by wet extraction methods used elsewhere, does not introduce losses by burning, and, incidentally, possesses the appreciable advantage of providing a dense ash product. The vast majority of the iodine is contained in the latter, but when to this is added all remaining traces which have been gasified, the value of the process will be better understood.

The application of electrostatic precipitation is both clean and efficient, and does not involve the use of extensive plant or apparatus. As most of these plants were originally patented, the initial costs of installation were somewhat high. To-day improvised plants have been set up, which have assisted in reducing the costs of producing iodine. The general working principles of these, as constructed by different makers, are similar and the method of recovery is as follows.

The selected seaweed is burned in large sheds and all gases evolved are passed into overhead pipes by suction obtained from ejector, pump or fan. Ejectors operated by water power are the most economical. The pipes from the different sheds, which are generally built along the short front, lead to a common flue. The pipe-end which is closely associated with the mass of slowly burning seaweed, is fitted with a large hood which literally surrounds the working area and ensures that all fine particles evolved are completely drawn off.

The gasified material which includes iodine and iodides

passes into the electrostatic precipitator, wherein all particles of solid matter are removed from the air by means of an electric discharge. The design of the plant is comparatively simple and consists of a series of vertical tubes through which the gaseous matter is caused to pass. In the centre of each tube is a wire.

When the tubes have become filled with gas, an electric discharge at high voltage is applied and practically all solid matter present in the enclosed atmosphere is directly precipitated, whilst the free air passes out of the plant. This process goes on continuously so long as the burning of the kelp, which proceeds slowly, is in progress. As the current has to be switched on and off to allow the deposited iodine mass to fall from the sides of the tubes, a small electrically operated timing switch is used. By this means no labour is required and the reclaimed iodine accumulates at the bottom of the plant in a hopper-shaped vat. The latter is periodically opened, and the contents removed for refining. The size of the electrostatic plant is determined by the volume of iodine-laden vapours which require to be cleaned per unit of time.

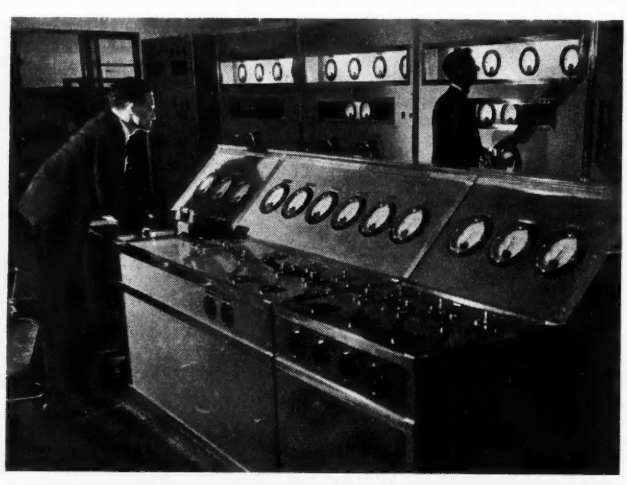
For raising the mains voltage to the high figure required, a synchronously driven mechanical rectifier is usually employed, best results having been secured with a direct current. All the suspended iodine is deposited upon the smooth sides of the collecting electrode tubes, which are represented by an extended surface, the fine particles migrate towards the weakest part of the field. In this recovery process, the only loss which can be sustained in the subsequent wet treatment is trifling, and practically the total content of iodine present in the seaweed is reclaimed.

New Regional Transmitter

High-power modulation used

THE official opening of the newly built Stagshaw transmitting station of the British Broadcasting Corporation took place on Tuesday of this week.

Situated near Hexham, the station enables an improved Regional service to be provided in Northumberland and Durham, the eastern parts of Cumberland and Westmorland and North Yorkshire. It will use the wavelength of 267.4 metres, thus superseding the low-power station at Newcastle-on-Tyne, whence the programme input will be received by land-line. Means for supervising the quality of the latter and for adjusting input volume by l.f. amplifiers are provided in the control room, together with a small master oscillator valve in conjunction with a very stable tuned circuit (housed in a thermostatically controlled oven) for maintaining the carrier frequency of 1,122 kc.



The transmitter control desk and part of the transmitter showing engineers about to check the operating conditions

The lay-out of the main equipment differs from that in any other B.B.C. station, although transmitters of somewhat similar type are in use at the Empire service station at Daventry. Instead of comprising a number of separate units with connecting feeders, the transmitting circuits with their valves (Standard Telephones & Cables, Ltd.) are mounted in one large enclosure with internal subdivisions. In this way the new station resembles Lisnagarvey and Burghead, but in contrast to them high-power "Class B" modulation is used and results in a considerable saving of input energy for a given output to the aerial, which is in this case 60 kW, the maximum allowed by international agreement upon the wavelength used by this station.

One advantage of such high-power modulation, representing a reversion to earlier practice, is that the design and operation of the apparatus are simplified. This system was originally abandoned on account of the difficulty of constructing reliable modulation-transformers of sufficient power. There are two separate amplifiers, first the h.f. one for dealing with the carrier-wave and, secondly, the l.f. modulator which amplifies the programme signal. The outputs of these are combined at high-power and fed through a three-position switch to the aerial through either of duplicate feeder lines or, alternatively, to a water-cooled artificial aerial that enables the transmitter to be adjusted without the necessity of arranging for actual radiation.

The metal enclosures containing the apparatus are all interlocked mechanically and electrically; in addition, all the tuned circuits are enclosed in aluminium boxes to screen them from mutual interaction and to prevent direct radiation.

A spare modulation transformer, interstage-transformers and the associated condensers are mounted within the enclosures, and in case of breakdown can be brought into circuit by links with very little delay. Similarly, a spare for any valve can be brought into operation immediately by switching.

There are no actual aerial wires, as the radiation takes place from the mast itself, which is described as an anti-fading arrangement. It radiates most energy horizontally ("ground wave"), so limiting the "sky wave." The "mast-radiator" consists of a 475-ft. insulated steel lattice mast standing on a 10-ft. concrete plinth, and is similar to that at the Burghead transmitting station in Scotland. The mast, which was erected by the Radio Communication Co., is surmounted by six equally spaced arms which form a capacity-ring. The arms are hinged so that the effective diameter of the ring can be altered to obtain the correct electrical constants for the operating wavelength.

Near the base of the mast is the aerial transformer house containing the aerial tuning circuits and the termination of the feeder line from the transmitter. The circuits and tubular concentric Marconi feeders are in duplicate.

Electrical energy is obtained from the mains of the North-Eastern Electric Supply Co., Ltd., through a sub-station on the site, which transforms the incoming supply from 20 kV, 50 cycles, three-phase to 440-250 V. There are two incoming cables and two transformers, each rated at 1,000 kVA, one being normally in reserve.

The power house contains a switchboard by Adamson & Green, Ltd., and a Crossley six-cylinder airless-injection Diesel engine rated at 600 h.p. at 375 r.p.m. directly coupled to an E.C.C. alternator rated at 400 kW, 440-250 V, three-phase, 50 cycles, which may be used in case of failure of the public supply, or synchronised with the incoming supply.

Also in the power house are two E.C.C. motor-generators, one being in reserve, rated at 30 kW 220 V for supplying the auxiliary apparatus, excitation and interlocking circuits, as well as to charge a Britannia battery rated at 220 V, 500 Ah for emergency lighting and to operate the auxiliary equipment of the Diesel engine should the public electricity supply fail.

The machine room contains two English Electric high-voltage motor-generators which feed the anodes of the valves in the final h.f. and modulator stages, together with an E.E. switchboard controlling them, one normally in reserve. Each consists of a motor directly coupled to a single generator of 400 kW at 14 kV, d.c. and also driving in tandem an E.E. main filament generator supplying 2,000 A at 28 V d.c.

In addition, there are two E.C.C. transmitter auxiliary anode high-voltage motor-generators, each consisting of an a.c. motor driving two generators in tandem. The generators, which are of 1A each at 2,600 V and 1,200 V, feed the anodes of the valves in the earlier stages of the transmitter; one machine is in reserve. There are two other motor-generators. Each consists of an a.c. motor driving three generators in tandem. These provide 500 V, 0.75 A d.c., and 325 V, 5 A d.c. for grid-bias; and 13 V, 80 A d.c. for filament heating.

The power for the control room apparatus is obtained from the a.c. supply by means of rectifiers of the metal-oxide type. Other equipment includes T.C.C. smoothing, coupling and aerial tuning condensers; Ferranti modulation transformers and iron-cored inductances; Crypton relay rectifiers; Turner and Weston meters. Watford contactors and Brookhirst motor starters are used, also Reliance intercommunication telephones and Synchronome clocks. The wiring and cable work was carried out by A. E. Sudlow & Co., Ltd., and the copper gauze screening by Marshall & Co. Revrolle electric thermal storage plant operates with the G. N. Haden heating installation.

Meetings and Discussions

Addressing the members of the A.S.E.E. this week, Mr. J. R. Beard, the new president, drew attention to a number of points, old and new, raised by the proposals for the reorganisation of distribution. Mr. J. W. Thomas drew upon his legal as well as his engineering experience in his address to the North-Western Centre of the I.E.E., when he dealt with the place of the engineer in the national life. An address of a descriptive nature was given to the Western Centre by Mr. H. G. Weaver who dealt with the remarkable advances made in the electrical driving of steel mills. Some useful suggestions in connection with large installations were made by Mr. J. G. Craven, the contractor-chairman of the North Midland Centre in his address last week.

Distribution Matters

IN his presidential address to the ASSOCIATION OF SUPERVISING ELECTRICAL ENGINEERS on Tuesday, Mr. J. R. Beard submitted that the relatively low consumption of electricity in Great Britain (compared with other countries), despite generating costs that bore comparison with those elsewhere, must be attributed partly to defects in the organisation of distribution.

After presenting an idea of what the public expected of the supply industry, he went on to consider how the undertakings could better meet its requirements and how far it was desirable that the State should step in to see what it could do and to remove legislative hindrances. A survey of the positions of municipalities and of companies led him to reject for the present a solution based upon public ownership of the whole electricity supply industry under a few regional distribution boards, themselves co-ordinated by a single national authority. He preferred a self-contained distribution unit that was formed of a group of communities based on a definite centre of concentration of population, the Electricity Commissioners to be given further powers of co-ordination in such matters as standardising accounting methods, systems and voltages and the structure of domestic tariffs.

It would be a mistake, he believed, to introduce a hard-and-fast method of grouping or a standard type of authority. Not only was distribution largely a local problem, but the most efficient form of organisation was not yet proved. For this reason, Mr. Beard felt strongly that the parallel existence of public and private ownership should be continued; this implied a form of public ownership in areas where municipal undertakings predominated, and a form of controlled public service company where private interests were now chiefly responsible.

The difficulty of the objection by small municipal undertakings to be merged in regional boards or public utility companies might be mitigated by allowing them to retain limited local functions as agents for the larger authority, such as those in relation to their consumers (subject to arrangements for standardisation as mentioned above), but without the power to design or extend their distribution systems.

Control of companies without sacrificing initiative and commercial incentive should not present an insoluble problem. The Acts of 1925, which regulated the London companies, had been successful in reducing the average price of lighting, heating and cooking kWh at a greater rate than in the rest of the country. In return for such regulation in similar and other respects, the companies should be given security of tenure for an extended period of forty or fifty years. In any eventual transfer the undertaking should be treated as a whole and the method of arriving at the purchase price predetermined in such a way as not to penalise further development.

In discussing his theme, Mr. Beard referred to the lack of uniformity of system and supply voltage as the worst "scar" on the technical side that had remained from early false steps because it directly affected the consumer for whom the industry existed. The cost of voltage standardisation had been estimated at between £15 millions and £25 millions (10 per cent. of the existing capital expenditure on distribution). This matter was of more immediate value to the supply authority than was frequency standardisation. One method of expediting the adoption of 230 V would be for the undertakings to be repaid part of the cost by decreasing contributions, which would become zero after five years. General availability of supply ought also to be achieved within the same period and the meeting of any temporary loss in doing so should take precedence of further reductions in price.

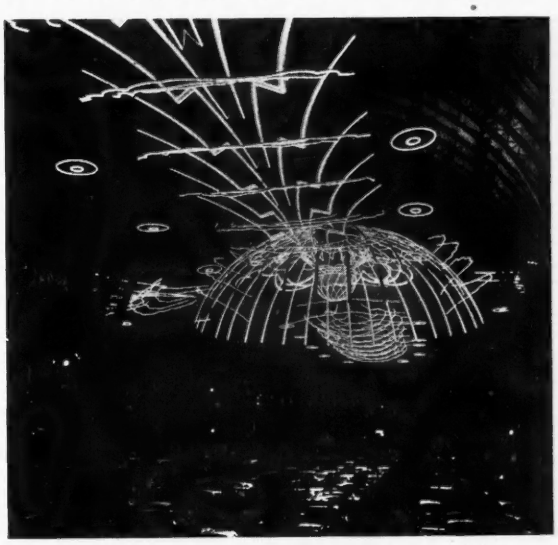
If a standard basis for the fixed portion of a two-part tariff was not immediately practicable for the whole country, local standardisation with a maximum kWh charge of ¾d. was certainly required. It was suggested that either the rateable value or floor area tariff might be offered, at the option of the consumer. As a substitute for the fixed charge, an initial consumption of a definite number of kWh at a high rate had advantages, provided prepayment consumers were not penalised. Considerations of rental and showroom facilities, standardisation of fittings, relief of rates and the improved position of the companies in regard to the raising of money were followed by a discussion of the most efficient size of distribution undertakings.

Figures were presented to show that distribution costs fell with increase in size, but the difficulty of making correct deductions from these was admitted. An indirect method of comparing distribution costs for retail supplies was suggested; this was founded on the assumption that the average price received per kWh sold for lighting, heating and cooking provided a rough but reasonably accurate criterion, and showed that the trend towards a decrease in price increased with kWh sold. Nearly 90 per cent. of undertakings sold less than 20 million kWh per annum for lighting, heating and cooking, which was the least amount needed to secure maximum efficiency. The ideal size of area was argued to be 1,000 to 3,000 sq. miles, depending upon its type and load density, but the risk of over-centralisation of management should be guarded against to maintain direct touch with the consumer.

The Engineer and the Community

THE professional status of the engineer and his place in the community formed the theme of the address to the North-Western Centre of the INSTITUTION OF ELECTRICAL ENGINEERS by Mr. J. W. Thomas, B.Sc., LL.B., on October 19th. Mr. Thomas said that the engineer was distinguished from members of other professions by the possession of a technique in which a knowledge of the theoretically possible was combined with a realisation of what was commercially and economically practicable.

Was the engineer a professional man? To constitute a profession there must be not only the special technique but those who practised it must be bound together in formal association. Such an association must not merely be a means of exchanging information; its essence was that it assumed certain responsibilities for the competence and conduct of its members. This implied some control over admission into the profession, enabling the public to distinguish between competent and incompetent practitioners.



The Paris Motor Show again provided an opportunity for some remarkable lighting displays. Our picture shows the employment of blue, light yellow and pink discharge tubes in an intricate design *[Elec. Rev. photo.*

Did the I.E.E. fulfil the conditions and to what extent? It would be generally admitted that the Institution efficiently achieved its primary purpose, "to promote the general advancement of electrical science and engineering and their applications and to facilitate the exchange of information and ideas on those subjects." The standard required for admission to corporate membership was relatively high; in its insistence

Distribution Considerations
The Engineer's Status
Steelworks Plant

upon practical experience in a responsible position it was more onerous than that of other professions of equal standing. The condition bore hardly upon those who, although possessing good theoretical and practical training, had, for one reason or another, been unable to secure a "responsible" position. That these men should be debarred from corporate membership was anomalous.

Engineering, unlike other professions, was unrestricted; any person could practise as an electrical engineer. Whether engineers should endeavour to secure a monopoly similar to that of lawyers and doctors and have some form of registration was still a highly controversial question. In course of time recognition would probably be secured not by legislation but by the general practice of those engaging engineers. Corporate membership of the I.E.E. was now almost obligatory in the case of the higher positions in electrical engineering.

Engineers were subject to certain legal obligations, making negligence and incompetence liable to penalties. Engineers were nowadays exposed to risk of injury without compensation which placed them in a far worse position than the employés whom they controlled. This was a matter in which the engineering institutions might take a greater interest.

The ability of an engineering institution to expel a member for unprofessional conduct was another distinguishing mark of a profession and it appeared to be upheld by the law. The rare invocation of the bye-laws of the I.E.E. regarding professional conduct was a tribute to the general high standard maintained by chartered electrical engineers.

Though service to the public should be the primary consideration, engineers were entitled to secure for themselves a reasonable standard of remuneration, especially in view of the cost of their training.

There was a tendency for the employment of a growing proportion of engineers by public bodies. This gave the engineer a greater feeling of service to the community and was bound to foster a new outlook which would eventually have far-reaching effects upon his professional status.

Engineers had been held responsible for many of the economic and social evils from which the world was suffering, but they had not complete control over the services which they rendered. This led to the question whether they should not take a greater part in public affairs. They could render a valuable contribution, by reason of their special knowledge, in the sphere of the distribution and consumption of commodities. But if they were to make such a contribution their education should be of a broader type. It should be the aim of a university not to make the engineering student merely a technical expert but to give him a broad view so that he would have a clearer conception of his place in the community and of the function which he was to perform in the national economic life.

An Institution like the I.E.E. could assist the cause of international understanding and goodwill by encouraging closer contact with corresponding bodies in other countries. Concluding on this note Mr. Thomas urged the closer linking of the engineering institutions to assist in the building up of a social order in which their knowledge and power could be used for the widest possible benefit of the community.

Steel Mill Drives

IN his inaugural address at Cardiff on October 11th as chairman of the Western Centre of the Institution of Electrical Engineers, Mr. H. G. Weaver (Whitehead Iron and Steel Co., Ltd.) contended that more electric power was generated and used in the iron and steel industry than in any other. He claimed that much of the success of large modern rolling mills was due to the way in which exacting requirements could be satisfied electrically.

Owing to the continuous nature of many of the processes, reliability of power supply was of great importance. When large shunt-wound motors were energised by rotary convertors, special precautions were necessary to deal with reverse currents when a momentary drop in the supply voltage occurred. The effects of such a disturbance appeared to depend more on its duration than its magnitude, and much attention was being given to the design of ultra high-speed apparatus for clearing faults on large systems of supply in the minimum of time.

The outstanding feature of the main driving motors installed in recent years was the large proportion of d.c. machines. Single armature or double armature motors had to reverse from full speed in one direction to full speed in the other direction in a few seconds, and peak outputs of 20,000 h.p. were not unusual. They were controlled on the Ward-Leonard principle. In one South Wales installation geared steam turbines had been used instead of motors to drive the generators and flywheel.

Single-speed, continuously running motors used to drive three-high mills for rolling blooms, or continuous (tandem) billet or sheet-bar mills, were usually low-speed a.c. machines of about 5,000 h.p. The most interesting main drives were in continuous (tandem) hot or cold rolling mills, where separate sections of the mill, and in some cases each pair of rolls, were driven by separate motors. It was the practice to install a.c. motors of the induction type, the speed of which was controlled on the Scherbius or Kramer system.

It was now standard practice to use a.c. motors for constant speed drives, and d.c. motors for variable speed drives. For instance, one mill was driven by a total of 15,000 h.p. of a.c. motors and 27,350 h.p. of d.c. motors, for the main drives. Including the motor-generators, the total plant used in connection with the mill amounted to 50,000 kW, and the maximum demand was about 30,000 kW.

When rolling coils of cold strip in tandem mills, it was necessary to maintain a definite constant tension in the steel strip. This required extremely close speed control, with automatic apparatus actuated by the strip itself passing over rollers supported on resilient bearing standards. Any motion of these standards varied the air gap in transformers placed at each end in such a manner that voltages were obtained which were directly proportional to the pressure on the roller. These voltages were used to operate regulators controlling the shunt fields of the motors. Tension in the strip between the unwinding reel and first pair of rolls was obtained by generating power from a dynamo driven by the reel.

An interesting type of cold rolling mill, from the electrical point of view, which had been installed in South Wales, was a reversing mill for rolling steel strip in coils. A single stand of four-high rolls, with a reel placed at each side, were each driven by separate motors. The coil of strip was placed on one reel and threaded through the rolls and attached to the other reel. The rolls and both reels were then accelerated to the speed required for rolling, and as the end of the coil was approached, the whole was decelerated to creeping speed, and then stopped. The rolls were then screwed down to give the required reduction of thickness, and the mill and reels were run in the reverse direction for the next pass.

The tension on the unwinding side was obtained by the strip driving this reel motor as a constant current generator, feeding power through a booster into the main generator. The tension on the winding up side was obtained by driving this reel motor with constant current input. The tension in each case was directly proportional to the armature current, and the current required was kept constant by regulators of the vibrating contact type, which operated through boosters in the shunt field circuits of the reel motors. When the mill was reversed after each pass, the functions of the reel motors were also reversed. The d.c. motors driving both reels and rolls were shunt wound and energised from a motor generator on the Ward-Leonard principle.

In some drives the r.m.s. of the load might be quite small compared with the maximum load, so that the ability of d.c machines to commutate very heavy overloads, or the maximum pull-out torque of a.c. motors, might be of more importance than temperature rise.

For driving continuously running, constant speed auxiliaries a.c. motors were generally used, of the squirrel-cage type up to about 25 h.p. and the slip-ring type for larger sizes. Variable speed, continuously running auxiliaries were usually driven by d.c. motors, with shunt field control, and in both cases the totally enclosed, fan or frame-cooled type, with ball or roller bearings, was the most satisfactory.

For drives such as live rollers, tilting tables, and roll screwdowns, which were subject to very severe (reversing) duty, special steelworks type a.c. and d.c. motors had been developed. They were totally enclosed, with split steel frames which enabled the armature or rotor to be quickly removed. In some recent installations live roller tables had been designed with individual motors for each roller, where frequent starting and stopping was required. In some types the roller itself was also the rotor of the motor and was energised by variable frequency motor generators.

A Contractor's Views

MR. J. G. CRAVEN (Green & Smith, Ltd.) is the first contractor to become chairman of the North Midland Centre of the Institution of Electrical Engineers. In his inaugural address at Leeds on October 12th he remarked that an enigma of the age was the fact that an electrical installation need not comply with any particular regulations.

For power installations v.i.r. cables in heavy gauge screwed conduit became excessive in size and cost. For instance, to carry 150 A a 0.25 sq. in. 3-core v.i.r. cable was necessary, as against a 0.12 sq. in. 3-core paper-insulated, lead-covered cable. Single-wire armouring, left bright, on paper-insulated lead-covered cables run in air, in industrial premises, gave ample

mechanical protection; the larger sizes should be provided with "whipping wires" to prevent barreling or bird-caging at bends. There was only necessity for double-wire armour, or serving, in very exceptional circumstances. For short cable runs between starters and motors up to 50 or 60 h.p. v.i.r. single-wire armoured cables were more economical than the paper-insulated class.

Modern factory construction was providing the contractor with additional difficulties, as the tendency was to eliminate steel stanchions, which, heretofore, had provided excellent fixing positions. The practice of installing conduits suspended vertically from the ceiling or roof trusses had to be resorted to.

In large machine-tool shops where a layout was available, trenches probably provided for the best electrical distribution layout, as the difference in the lengths of the final sub-circuits was very noticeable, thus reducing the cost of the installation to the minimum, even when the cost of the trenches and chequer plating was taken into account.

Dealing with industrial lighting, Mr. Craven said that not more than two high wattage gasfilled lamps (*i.e.*, 1,000 or 1,500 W) should be controlled by one 15-A switch, which should be of the quick-make, slow-break pattern, when used on a.c. supplies. When breaking 8.7 or 13 A on a 230-V a.c. circuit there was practically no arcing with this type of switch.

The enamelling of the oil switches in a canteen cooking installation to match the ranges, ovens, and grills, etc., resulted in a rather exceptional occurrence. A continuity test was made between the armouring of the incoming and outgoing cables and gave a "Megger" reading of over one megohm; on investigation it was found that the armour clamping plate, and the nuts on the studs securing it, had also been vitreous-enamelled, and this presented a very high degree of insulation.

Incidentally, a test made for continuity on the ovens and hot cupboards again showed that there was no continuity between the various vitreous-enamelled sheet steel tops and sides, although these were fixed by means of screws to a steel frame.

There was a wide field open to the contractor in connection with the installation of condensers on consumers' premises to correct low power factor. For instance, recently a consumer required an additional 220 h.p. installed and the supply authority met this demand without additional mains, solely due to the fact that condensers were installed about two years ago of 165-kVA capacity. Without the condensers the consumer's service was practically fully loaded.

The utilisation of electricity in thousands of houses built during even the last decade was throttled from the outset, as they were wired only for lighting, and possibly one plug for a wireless set or electric iron. The dawn of the era was all too slowly breaking when domestic premises would be provided with adequate outlets so that at least a few of the scores of available domestic appliances could be utilised.

There was still a lack of uniformity among designers regarding the fixing of lighting fittings to standard installation accessories, and the fact that there were B.S.I. outlet boxes with standard fixing centres did not appear to have penetrated into fittings design offices to the extent one would expect.

The Electricity Supply Regulations (1937) now required that electricity supply authorities should not, in carrying out installation work on consumers' premises, accept a lower standard than that which they required of contractors. This was the first time the contractor had been protected in this way. But the I.E.E. Regulations as yet had no statutory backing, and installations were still being connected to the supply mains which violated them. The suggestion that all installation work might be carried out in consumers' premises by the supply authorities' contracting departments was unlikely unless all electricity undertakings were taken over by the State. The contractor's sphere was justified, and craftsmanship had its place in installation work.

Economics of Rural Supply

IN his inaugural address at Liverpool on October 18th as chairman of the Mersey and North Wales Centre of the INSTITUTION OF ELECTRICAL ENGINEERS Mr. G. K. Paton (North Wales Power Co., Ltd.) drew attention to the great diversity of conditions which his undertaking had to cater for. For instance, whereas Cheshire was a rich farming county with large dairy farms capable of taking and paying for electricity which could be used extensively, in Anglesey and other Welsh counties of low rateable value there were small farms, holdings and large tracts of land only fit for sheep grazing where electricity was not in such great demand and the powers of salesmen were taxed to the utmost. Thus the commercial aspect required most careful consideration in planning rural development, while as a rule the technical and purely engineering parts of the scheme were quite straightforward.

In the North Wales and South Cheshire area over 40,000 consumers had been connected and progress was still maintained at the rate of over 6,000 consumers per annum, not including the areas of the local authority undertakings, which took supplies in bulk. For the Bedford scheme of 109 sq. miles energy was purchased at a price lower than the grid tariff; the average rate was 0.3858d. per kWh. But the financial result was a loss of £6,520 in 1936, and the accumulated deficiency amounted to £22,314. The flat-rate tariff was 8d. per kWh, but the average price obtained was only 0.835d. per kWh, which was too low.

The Norwich scheme was, if anything, more rural, and the area was only 125 sq. miles. The average capital cost of mains was £650 per mile, compared with £1,100 per mile in Bedford, probably due to greater use of underground cables in the latter scheme. The purchased energy cost was only 0.354d. per kWh average on a tariff of £2.93 per kW, plus 0.122d. per kWh, an exceptionally low price. The financial result was a loss of £2,800 in 1936, with an accumulated deficiency of £13,809.

In the Dumfries-shire County Council area of 1,071 sq. miles sales in 1936 were 5,813,235 kWh, an average of 922 per consumer, producing from domestic consumers £5.92 and from farms £11.42 per annum per consumer at an average rate of 1.97d. and 1.81d. per kWh respectively. The rates were 8d. per kWh for lighting or £1 per assessable room per annum plus ¾d. per kWh on the residential tariff. The cost of energy was 0.563d. per kWh and the financial result was a gross surplus of £18,601, which was approximately 5 per cent. on the capital cost.

Anglesey was a county of 276 sq. miles with an average population of 178, but if Holyhead and Menai Bridge were omitted, both being served by the local authority undertakings, there remained an area of 273 sq. miles, with an average population of 135 per sq. mile, compared with populations of 198 in the Bedford area, 110 in Norwich, 54 in Dumfries-shire area (which did not include the county town of Dumfries), 216 in certain distribution areas in England, and 192 in the North Wales area.

The capital cost per consumer connected in the Bedford area was £54, in Norwich £46, in Dumfries-shire £58, and in similar rural areas served by distribution companies in England £40, while in the area of a rural district council taking supply in bulk the capital expended by the local authority was in the neighbourhood of £32 per consumer connected.

The County of Anglesey scheme was not complete and further areas had yet to be developed, but the estimated capital cost in these initial schemes did not exceed £36 per consumer connected. In the North Wales area the actual cost was an average of £23 per consumer connected. In certain urban areas the cost varied from £25 to £30 per consumer connected.

It would appear that the capital cost to the undertaking per consumer connected in rural areas other than North Wales was from 60 per cent. to 100 per cent. greater than the corresponding cost in an urban area of supply. The average revenue per consumer in the rural areas appeared to be from £5 to £6 per consumer, and the ratio of connected load to maximum demand was also about the same in all the rural areas, *viz.*, 5.9 to 1.

In North Wales supply was given over an extensive mixed area of over 4,000 sq. miles. Supplies in bulk were given to 17 local authorities who distributed within their own areas and with the consent of the J.E.A. The Distribution Company purchased in bulk at over 200 points and had also built up its own secondary system as a natural sequence to the construction of the main transmission system of the Power Co., and consequently the extension of the secondary e.h.v. mains was much less than would be required normally to supply these areas.

While the initial rural development costs in North Wales were lower than elsewhere, it followed that the cost of supply must include a proper proportion of the transmission costs of the Power Co., and with over 1,000 miles of main transmission route the transmission charges were an important factor in arriving at the true cost of supply.

The recommendation of the McGowan Committee that rural areas should be grouped with urban areas appeared to refer to districts immediately adjacent to large urban areas. The problem of the more remote areas such as those in Wales could only be solved by the gradual extension of the transmission system through districts where the demand for electricity could be justified on some average basis. The extent to which further rural development could be made would depend on the margin of profit which could be earned in the more densely populated parts to recoup the losses in the early years of development in the rural areas. The low level of present prices in the urban areas made the problem a difficult one.

Correspondence

Contributions from readers are welcomed. The writer should give his name and address, not necessarily for publication

Earth Resistance and Potential Trips

It does not seem to be realised that the resistance of a circuit through wet soil, can be enormously increased by the passage of a unidirectional current of only a few mA. Pure water is practically a non-conductor, and a circuit is only obtainable when chemicals are present in solution. If these chemicals are removed by filtration then the resistance of the water will increase; the practical effect of this is that an earth electrode near the ground surface is usually more effective than an equal area of the same electrode several feet deep, since the water is filtered as it seeps from the surface.

When investigating this subject I observed the resistance-increase effect when a small current was conducted through wet soil. Subsequently I found the effect could be reproduced by fitting a glass tube with a plug, through which an electrode was passed into the tube, then mounting the tube vertically and partly filling it with water containing, for example, lime in solution. A plug of cotton wool—to take the place of vegetable fibre in soil—was then placed in the tube and more water added until a second electrode could be immersed from the top, the cotton wool thus becoming saturated with the water.

If a small alternating current of, say, 10 mA is passed through the sample, no change in resistance is observed; but if a half-wave rectifier is connected in the circuit the effect is to produce unidirectional current impulses when the resistance of the sample will build up until no circuit can be detected. If the direction of the current impulses are reversed, before the circuit through the sample reaches an infinity value, the resistance will gradually fall to its original value; after this the resistance will increase again to a maximum value. If tests are then made at the cathode it will be found, in many cases, that the water has become strongly alkaline.

The fact that the cathode can "attract" alkaline solutions as the result of a small leakage, or capacity current, indicates that all manner of chemical compounds can be formed at the surface of an earth electrode. One effect is to corrode the electrode, another is to convert the electrode into a half-wave rectifier of small currents at low potential. The final effect of these small currents is either to isolate the electrode or to create a very high resistance in the path of a leakage current intended to energise a protective relay.

Under the conditions described, while the earth resistance may not be too high for the satisfactory operation of a protective relay when it is first installed, a current of much smaller magnitude than is required to energise the relay can create a set of conditions which will finally prevent the relay from functioning under fault conditions. High-voltage lines have made contact with the ground but the protective relays have remained inoperative; yet no defect has been discovered in the relays.

In the case of earth leakage trips, which may not be required to function for some years after they are installed, there is no certainty that the full line voltage across their trip coils and earth circuit will be sufficient to energise them, much less the proposed 30-V tripping potential.

Incidentally, earth-leakage trips when intended to operate before a dangerous voltage is created between apparatus and earth, should be given a new name to distinguish them from those which operate at a stated current, *e.g.*, 30 mA. The term—"leakage-potential trips" would be preferable.

In my view the only certain way to actuate a trip with low voltage is to connect the trip coil to either an earth wire connected to the transformer earth plate or to the neutral at the consumer's site.

A. G. BULLEN.

Liverpool, *October 11th.*

Thanks for Improvements

Having had some hard things to say about manufacturers at various times, I am delighted to be able to pay them a compliment when the occasion arises.

About eighteen months ago (ELEC. REV., April 10th, 1936) you published some notes of mine relating to the causes of fusing in domestic installations. In this article I pointed out that according to my records, the greatest single cause of sub-circuit fusing was the premature failure of lamps, and that E.L.M.A. lamps formed a very large proportion of the offenders. I expressed the hope (not too optimistically, I'm afraid) that the then new coiled-coil lamps would help to reduce the number of fuses blown by short-circuiting within the bulb.

Not only has this hope been fully justified, but I can truthfully say that I have never seen a coiled-coil lamp which has failed and blown a fuse. Even when burnt upside down (cap downwards), this annoying characteristic of gas-filled lamps appears to be entirely eliminated. I do not profess to understand why this should be so, unless it is because the shape and disposition of the new filament allows the leading-in supports to be farther apart. E.L.M.A. candle lamps also show a great improvement since they have been fitted with a "bunched" filament in the upper part of the bulb, and a burst or blackened candle lamp is a thing of the past.

This great improvement is of much more importance than the well-advertised increased percentage of light, and the contractor can now sell E.L.M.A. coiled-coil lamps with the full confidence that he will not be called in a day or two later by a disgruntled customer to replace a fuse due to a faulty lamp. This is a splendid sales argument in these days of cheap competitive lamps retailed at from 6d. upwards.

Those who are not in close touch with consumers may think that undue importance is placed on this occasional lighting sub-circuit fusing, but I can assure them that it can do much harm to the prestige of domestic electricity. I have found that gas companies' officials are not slow in seizing the opportunity of pointing out the alleged unreliability of electricity for other domestic uses. A clever salesman can paint a colourful picture of the electric cooker failing in the middle of an important dinner party. A certain type of consumer seems incapable of grasping the fact that what the lay Press calls "the fusing of an electric wire" is the safest form of protection he has against fire and shock.

Fusing from other causes appears to be decreasing, too, one contributing cause being the use of improved flexibles, where the two poles are held apart by some non-conducting strengthening material. A fault thus results in the failure of the appliance concerned only, instead of sparking across to the other pole and putting half a dozen plugs out of action.

The current practice of earthing radiators naturally increases the tendency to blow a fuse when a fault develops, but this is more than compensated for by the almost total elimination of non-standard heating plugs, where the closely positioned pins gave rise to arcing, or tracking when some forms of synthetic resinous material was used.

The thanks of the industry are due to manufacturers for increasing the reliability of domestic electricity, and I feel sure that they will reap their reward by increased sales in the future.

JOHN BLAND.

London, N.W.2, *October 18th.*

Earth Leakage Trips

I thank Mr. Lawes for drawing my attention to a rather misleading paragraph in my recent article. It should have been made clear that the size of wire used for coil windings—28 to 30 s.w.g.—referred to the sub-station switch only. Current is, of course, flowing over this coil practically continuously. The ordinary domestic trip has coil windings as fine as 35 or 36 s.w.g., but the conditions of usage are not similar.

At the same time, Mr. Lawes's figure of 200 ohms for the d.c. resistance of an ordinary trip coil is rather high, as in most Continental equipment that I have tested recently this resistance is from 56 to 170 ohms, and the latter figure only appears in connection with very fine coil windings—0.14 mm. diameter, corresponding roughly to 38 s.w.g. This is the smallest wire used by any of the leading manufacturers, and even then the coil is shunted with a gap for lightning protection.

T. C. GILBERT.

Folkestone, *October 16th.*

Institution of Civil Engineers

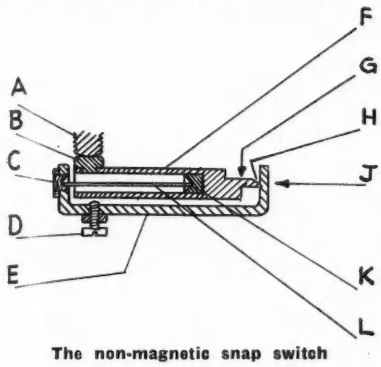
During the first half of the 1937-38 session of the Institution of Civil Engineers, papers will be read dealing with a variety of subjects including "Recent Engineering Developments in the General Post Office," by Sir George Lee; "Combustion Efficiencies of Gas and Oil Engines," by Mr. W. A. Tookey; "Dover Train Ferry Dock," by Mr. George Ellson; and "The Design and Operation of the Coleshill Sewage-Disposal Works of the Birmingham, Tame and Rea District Drainage Board," by Mr. F. C. Vokes. Joint meetings have been arranged with the Institution of Chemical Engineers, and the British Section of the Société des Ingènieurs Civils de France and the Institution of Structural Engineers, and at informal meetings "The Education and Training of the Engineer to meet Modern Requirements" and "Electrical Peak-Loads and Methods of Dealing Therewith" will be discussed. Mr. S. B. Donkin will deliver his presidential address at the opening meeting on Tuesday, November 2nd.

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

Non-magnetic Snap Switches

Defects common in permanent magnets when used to produce a snap action in a switch, such as those due to demagnetisation from ageing, heating, hammer action and neighbouring electric fields have, it is claimed, been eliminated in a compact non-magnetic mechanism produced by ROBERT MACLAREN & CO., LTD., Eglinton Works, 110, Kilbirnie Street, Glasgow. This device is applicable to thermally or manually operated switches and particularly as a thermostat. The principle employed represents a simple application of a flat triangle of forces in which two resilient and one transverse resilient forces are momentarily in equilibrium, the slightest increase in the latter causing the system to collapse.



The non-magnetic snap switch

A. Fixed contact. B. Moving contact. C. Differential adjustment and frictionless bearing. D. Adjustable stop or contact. E. Spring cradle. F. Switch arm. G. Transverse resilient force. H. Knife edge. J. Longitudinal resilient force created by spring cradle. K. Frictionless bearing. L. Strut.

In practice, a hollow switch arm, having a knife-edge pivot at one end and carrying a moving contact at the other is supported by a strut held in compression between frictionless bearings and mounted out of line with the knife edge. The resultant forces due to the cradle and the strut form a couple tending to turn the switch arm clockwise, thus bringing the moving and fixed contacts together. For opening the circuit a transverse resilient force is applied that results in instantaneous counter-clockwise movement of the switch arm as far as an adjustable stop. This transverse force is produced by an expanding member of a thermostat and is conveyed to the point of contact by a spring. The force holding the contacts together is adjustable.

Temperature differentials are obtainable by varying the resilient longitudinal force and thus the strength of the clockwise couple. Vibration only slightly reduces the small inherent friction in the system towards zero so that it opens circuit a little earlier. The tension with which the knife edge of the switch arm is held in its cradle is said to be enough to prevent heating with currents up to 20 A flowing, but flex is fitted for currents above 15 A.

High-voltage Change-over Switch

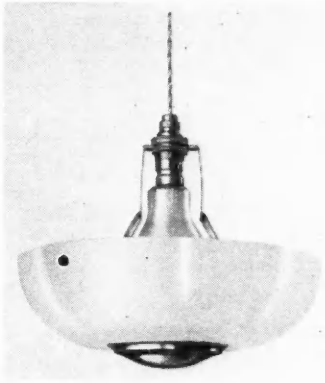
The accompanying illustration shows an 11,000-V change-over switch which has recently been supplied by SWITCHGEAR AND EQUIPMENT, LTD., Eagle House, 95-96, Cannon Street, London, E.C.4, to a Midland undertaking for use on overhead transmission systems.

The unit has on each phase a centre pivoted insulator fitted with a double-ended contact which closes the circuit either one side or the other. The line connectors are taken to the outside posts and the tee-off is connected to the centre blade by means of a flexible connection from three post insulators.

Operation is by a standard stirrup-type handle suitably modified for the double travel and so arranged that two separate movements are necessary to change the switch from "on" on one side to "on" on the other side. A single operating tube couples the handle to the "D" section coupling tube on the switch, which is fitted with the standard "SE" fully floating contacts capable of carrying 200 A, with steel arcing horns.

A Neat Domestic Lighting Fitting

Designed especially for use in flats and small houses the new domestic lighting fitting made by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2, should prove popular.



The G.E.C. domestic fitting

Consisting of a chromium plated carrier with an 11-in. diameter inverted bowl in various colours, this modestly priced fitting can be attached to the lampholder of any existing flexible cord pendant, its light weight enabling it to be used without further support. A chain can, however, easily be attached and suspended with the flexible where preferred. This fitting is available with either a white, pink, green or champagne bowl, and is designed for use with either 100- or 150-W lamps.

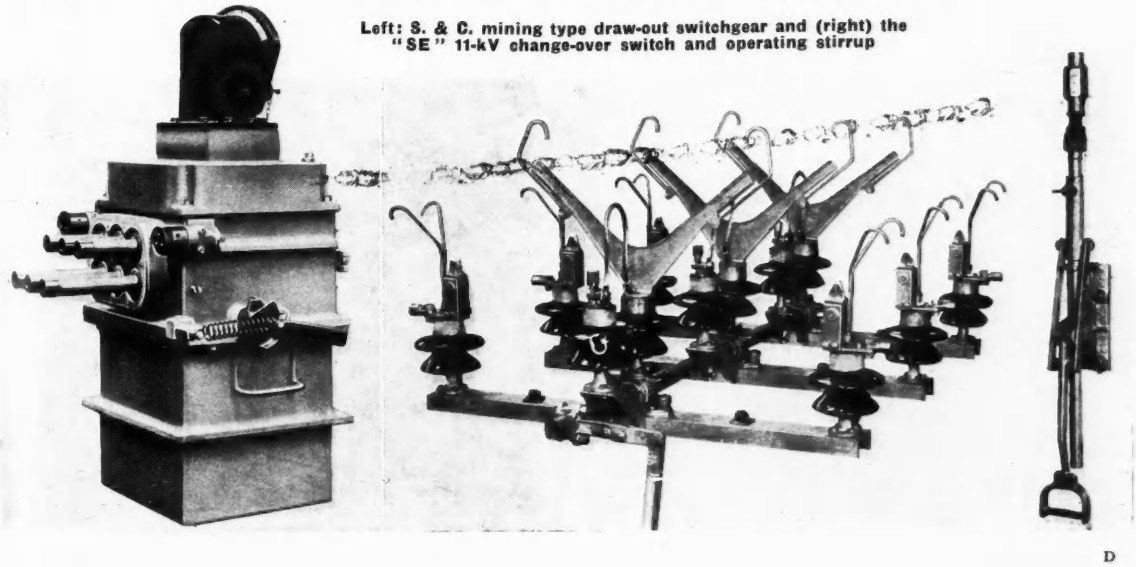
Floodlight Projectors

GRAHAM FARISH, LTD., Masons Hill, Bromley, Kent, announce that their range of floodlight projectors will in future be available in silver or gold finish.

Internal Earthing of Mining Switchgear

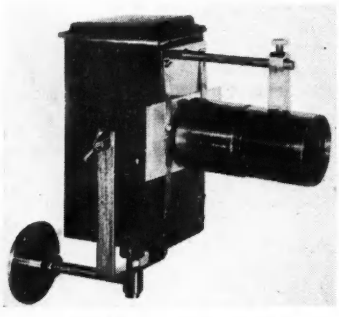
With a view to providing an additional margin of safety in the operation of mining type draw-out switchgear an internal earthing feature has been designed by SWITCHGEAR & COWANS, LTD., Old Trafford, Manchester, for incorporation in its pedestal units. This consists of a modification of the isolating contacts of this type of gear, so that the earth position is reached by withdrawing the circuit-breaker a few inches, when the top set of isolating plugs makes contact with a gun-metal earth plate (forming part of the frame) at the front of the isolating plug box. An automatic stop prevents operation until the circuit-breaker and isolating contacts are in the correct position for earthing. When in the earth position the breaker is closed by a separate handle, appropriately labelled, which can be padlocked. Speed and continuity are given to the closing action by a spring. A mechanical interlock puts the main operating handle and the automatic parts out of action so that the main operating handle is locked out when the breaker is in the earth position.

Left: S. & C. mining type draw-out switchgear and (right) the "SE" 11-kV change-over switch and operating stirrup



Illuminating Pictures and Tapestries

Increasing public interest in the illumination of pictures, tapestries, curtains, &c., by means of spotlights has encouraged WHITEWAY LIGHTING, LTD., 22, Bruton Street, London, W.1, to produce a new model which can be installed at a much lower cost. Measuring only 7 in. high by 3¼ in. wide, this new spotlight is designed to be concealed from view, the beam of light being projected through a small hole about an inch in diameter which is the only indication of the source of the light. It is capable of giving a high intensity, and is fitted with adjustable screens to control the area of light. Normally, a 100-W lamp and a resistance or transformer for use with either a.c. or d.c. are supplied, but a 12-V, 48-W lamp can be fitted if desired.



A Whiteway spotlight

G.E.C. Radio Receivers

"Controlled muting" and "adjustable fidelity" are among the features in the new "All-Wave Quality 8" and "Fidelity All-Wave 8 Record Changer Radiogram" introduced by the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, London, W.C.2.

The "Quality 8" is a 3-band superhet with two triodes in the push-pull output stage giving a rich full tone and a 6-W output. A new variable fidelity feature enables powerful transmissions to be reproduced with true fidelity without loss of selectivity on the more distant stations. Operation is simplified by the use of only two knobs with concentric thumb controls, settings showing automatically on the dial. The radiogram, with automatic record changer, has a hand-polished inlaid walnut cabinet with a piano-type lid which allows the instrument to be kept close to the wall. A new type of record changer permits a series of records up to eight to be played, automatically and silently changing records and switching off at the end of the series and rejecting any unwanted discs.

The radio section is a 4-band 8-valve receiver with a push-pull output stage giving 6 W undistorted output. The two short wave bands between them cover a range of from 13 m. to 82 m.

Fault Locator

The "Voltascope" is a new testing instrument, introduced by G. W. TURNER, 32-34, Kennedy Street, Manchester, 2, and designed for tracing faults and open circuits on both a.c. and d.c. low-voltage systems.

The standard model is supplied for use on any supply between 110 and 750 V, and will indicate whether a line is live, etc., whether a single pole switch is on the "live" or "neutral" wire and the polarity of d.c. circuits. It is made of bakelite, no metal parts other than the contact points being exposed, and a well protected neon lamp emits a glow when on circuit. The apparatus should prove particularly useful to mains engineers.

The "Voltascope"

In the Courts

Alleged Defect in a Fitting

MR. JUSTICE HAWKE in the King's Bench Division on October 13th delivered his considered judgment in the action brought by Mrs. Ruth Dransfield, Bournemouth, against British Insulated Cables, Ltd., to recover damages in respect of the death of her husband, Mr. H. Dransfield, who at the time of his death was a linesman in the employ of the Bournemouth Corporation. Mrs. Dransfield sued on behalf of herself and her three infant children. The previous proceedings were reported in our issues of June 18th and August 6th.

The material facts were that in November, 1935, the Bournemouth Corporation was engaged in converting its tramways to trolley-bus operation, and on November 19th Mr. Dransfield was knocked off the platform of an overhead wagon on which he was working, sustaining a fatal fracture of the skull. The plaintiff's case was that the accident to her husband was due to the breaking of a "bull-ring," through which the trolley wire was passed, and which had been manufactured and supplied by the defendants to the Corporation, and that the accident was caused by the defendants' negligence on the ground that the bull-ring was made of inferior metal, joined by means of a butt-weld which was defective in that fusion had only taken place over about one-third of the surface of the section.

The defendants denied that the accident to Mr. Dransfield was due to their negligence. Alternatively, they pleaded that if the bull-ring was defective because it was not strong enough for the purpose for which it was being used, or by reason of the defects alleged by the plaintiff, such condition was discoverable by the Corporation, its servants or agents after it was supplied. Defendants further alleged that they had no knowledge of any of the defects in the article alleged by the plaintiff, and denied that in the circumstances they were under any duty to the deceased man.

During the course of the hearing of the evidence his Lordship said he considered there was *prima facie* evidence of negligence in the welding, and at the conclusion of the evidence and the arguments of Counsel he reserved the judgment, which he now delivered.

His Lordship said that he came to the conclusion that there was negligence in the making of the bull-ring. Its condition was such that ordinary tests would have disclosed that there was negligence in the act of welding and the proper inspection of the ring. But there was a second question, and that was whether there was any relation between the deceased man and the defendants so as to make it the duty of the defendants to take care. A decision on that part of the case rested upon the legal authorities. In the present case that one factor of proof was lacking, and he must therefore give judgment for the defendants, with costs.

In case a higher court took a different view he thought it would facilitate matters if he assessed the damages. He accordingly decided that under the Fatal Accidents Act, 1846, Mrs. Dransfield would be entitled to £1,800 and her children to £540; under the Law Reform Act, 1934, on the expectation of the life of the husband, he assessed the damages at £500—in all £2,840. Judgment was entered accordingly.

An Unguarded Polishing Machine

In the King's Bench Division on October 14th, before Mr. Justice Greaves-Lord, Miss Harriet E. M. Johnson (17), suing through her father, claimed damages from the Telephone Manufacturing Co., Ltd., for personal injuries which she alleged to be due to the negligence and/or breach of statutory duty of defendants.

The plaintiff's case was that on November 2nd last year while engaged on a polishing machine in the company's works, her left hand was caught in the machine, her little finger being smashed and another so badly injured that it had to be amputated. She alleged that the machine was not properly fenced or of such position and construction as to be safe as required by Section 10 of the Factory and Workshop Act, 1901.

The defendants denied liability, negligence and breach of statutory duty and alleged that the accident was caused by the plaintiff's own negligence in not using the machine with proper care and not using it as she was instructed to use it, *viz.*, to polish key buttons affixed to a holder. Defendants further said that the plaintiff had wilfully and recklessly brought her hand into proximity with the machine when her hand was holding a piece of string, which had no relation to her employment on the machine, although she knew or ought to have known, that there was a risk that the string would be entangled or caught up by a revolving part of the machine. In these circumstances the defendants alleged that the plaintiff had been guilty of contributory negligence.

Mr. J. Russell, on behalf of the defendants, submitted that having regard to the medical evidence and to the fact that the plaintiff was at the present time earning the same wages as she did before the accident, the damages, even if the defendants were liable, should be extremely small. He contended, however, that the defendants were not liable. The expert evidence, in his submission, had established that a guard on the mop could not be effective and that the revolving shaft which had little power behind it was not the source of much, if any, danger. It was clear from the evidence that the accident would not have happened if the string at the time had not been dangling from the plaintiff's hand or arm.

In giving judgment his Lordship said that the case required very careful thought in deciding it. The evidence showed that the defendants were very careful employers, but he had come to the conclusion that this machine without a guard was a dangerous machine, and in his view, the accident happened because the machine was not guarded. That being so the only question left was to assess the damages and on that question he awarded the plaintiff £125 with costs.

Winding-up Petition Dismissed

In the Companies' Court on October 18th Mr. Justice Simonds dismissed a petition for the compulsory winding-up of Alpha Manufacturing & Electrical Co., Ltd., on the ground that the amount of the debt on which the petition was founded had been paid. The petitioner did not oppose the dismissal of the petition without costs.

British Overseas Electrical Trade

In September our exports were 28 and imports 13 per cent. above the values for the same month last year

ALTHOUGH none of the major classifications of British electrical exports last month reached the highest values recorded this year, each was so substantial that the cumulative effect was to produce the best total for several years. There was, too, a further strengthening of the trend which we noted in our analysis of the August Board of Trade returns, namely, for exports of electrical equipment to expand at a greater rate than imports.

Compared with September, 1936, which contained an equivalent number of working days (twenty-six) exports, at £1,622,527, were worth £353,175 more, representing an improvement of 28 per cent., while imports were up by £52,738 (13 per cent.) to £452,175. The expansion of exports last month over August (twenty-five working days) was also considerably in excess of the advance in imports—£221,889 against £19,640. Another interesting comparison is with September, 1930, the most recent occasion on which the past month's exports were exceeded in value. The total then was £1,747,900, but the difference between exports and imports (£1,065,362) was less than last month (£1,170,352).

Already this year shipments of wires and cables are more than £1,000,000, or 50 per cent., up on the corresponding period of last year, and there does not seem any sign of the demand lessening as yet. Apart from the telegraph and telephone type, there was an increase of £117,470 last month as compared with September, 1936. An indication of the chief destinations is given in the following analysis, with comparative values:—

Rubber-insulated wires and cables, other than telegraphic and telephonic.—Australia, £35,806 (£31,051); South Africa, £30,023 (£26,597); British India, £20,080 (£12,842); New Zealand, £10,762 (£7,331); other British countries, £26,575 (£14,815); and foreign countries, £13,625 (£11,297).

Electric wires and cables, insulation other than rubber.—South Africa, £58,598 (£31,688); British India, £39,375 (£21,106); Australia, £36,306 (£14,289); other British countries, £30,976 (£15,336); and foreign countries, £19,031 (£17,335).

Another effect of electrical development overseas is the substantial shipments of switchgear leaving these shores. For the past three months the values have been £122,178, £154,924 and £166,358, representing increases of £17,248, £68,773 and £64,459 respectively. Telegraph and telephone apparatus exports have likewise shown a continued expansion, the values for the past three months being £176,193 (+£16,477), £177,235 (+£60,858) and £183,075 (+£51,714). The chief destinations of such shipments last month, with September, 1936, values in parentheses, were as follows:—Australia, £39,525 (£25,534); South Africa, £36,509 (£14,640); Argentina, £15,966 (£34,733); other British countries, £53,008 (£27,970); and other foreign countries, £38,067 (£28,484).

It is satisfactory to note that radio apparatus exports improved during September, whereas imports were lower. A similar tendency is observed in the case of lamps, although the number imported rose despite a reduction in value.

A closer examination of the machinery export figures reveals that the effect of additional generating plant sent to Australia was largely offset by shipments of a lower value to other countries. Quantitatively, generating plant exports aggregated 622 tons, against 561 tons recorded in September, 1936.

A more even distribution of increases is noticed in the case of motors, and particularly pleasing is the substantial participation of foreign countries. According to weight exports of motors advanced from 649 to 788 tons.

Cable imports reached a high level—£12,987 ahead of August and £30,289 up on September, 1936. The following analysis shows the main sources from which goods and apparatus were obtained, with comparative values:

Germany, £97,504 (£71,428); United States, £82,125 (£95,617); Netherlands, £75,311 (£61,635); Belgium, £34,095 (£23,238); Switzerland, £20,210 (£17,943); France, £9,024 (£10,108); Austria, £7,856 (£6,826); other foreign countries, £40,148 (£36,847); and British countries, £17,469 (£19,592).

In the first nine months of this year the value of British electrical exports was £13,274,884, an increase of £2,417,355 over the corresponding period of 1936, imports having risen by £584,784 to £3,686,848.

EXPORTS AND IMPORTS DURING SEPTEMBER

	Exports. Sept., 1937.	Exports. Inc. or dec. compared with Sept., 1936.	Imports. Sept., 1937.	Imports. Inc. or dec. compared with Sept., 1936.
Submarine telegraph and telephone cables	£12,185	+ £11,990	*	—
Telegraph and telephone wires and cables (not submarine)	53,630	+ 21,334	*	—
Other insulated wires and cables	321,157	+ 117,470	£66,609	+ £30,289
Radio receivers, not radiograms (excluding valves)	38,129	+ 5,247	14,312	− 1,129
Radio transmitters (excluding valves)	26,831	+ 5,399	*	—
Radio valves	38,016	− 4,352	24,471	+ 8,530
Other radio parts and accessories	46,468	+ 5,278	90,941	− 14,120
Telegraph and telephone apparatus (other than radio)	183,075	+ 51,714	*	—
Electric carbons	*	—	10,356	− 3,582
Incandescent lamps	54,139	+ 3,617	13,134	− 2,194
Other lighting apparatus	54,537	+ 7,823	56,949	+ 3,559
Primary batteries	14,245	− 1,850	*	—
Accumulators	54,815	+ 2,692	*	—
Electric cooking and heating apparatus	29,469	+ 9,948	*	—
House service meters	16,014	− 5,977	*	—
Other electrical instruments	21,608	+ 716	25,506	+ 4,674
Unenumerated electrical goods and apparatus	133,837	+ 20,756	81,464	+ 14,481
Electric generators up to 200 kW	26,054	− 327	*	—
Electric generators over 200 kW	86,969	+ 18,635	*	—
Electric motors	122,471	+ 23,457	27,064†	+ 1,064
Convertors and transformers	50,166	+ 1,629	*	—
Starting and controlling gear for motors	38,737	− 12,091	*	—
Switchgear	166,358	+ 64,459	*	—
Other electrical machinery	12,871	+ 1,037	27,211	+ 10,345
Electric vacuum cleaners	20,746	+ 4,571	14,158	+ 821
Total	£1,622,527	+ £353,175	£452,175	+ £52,738

* Not classified separately. † Not railway and tramway motors.

BRITISH ELECTRICAL EXPORTS DURING SEPTEMBER

Destination.	Goods and apparatus, Sept., 1937.	Inc. or dec. compared with Sept., 1936.	Electric generators, Sept., 1937.	Inc. or dec. compared with Sept., 1936.	Electric motors, Sept., 1937.	Inc. or dec. compared with Sept., 1936.	Other electrical machinery, Sept., 1937.	Inc. or dec. compared with Sept., 1936.
Irish Free State	£46,796	− £2,397	*	—	*	—	*	—
Channel Islands	11,918	− 714	*	—	*	—	*	—
Union of South Africa	196,056	+ 54,353	£11,037	+ £5,940	£18,902	− £4,942	£103,876	+ £28,828
British India	137,536	+ 40,857	11,329	− 20,106	14,286	+ 733	38,591	+ 10,399
British Malaya	29,773	+ 5,628	*	—	*	—	5,994	− 1,724
Ceylon	12,941	− 631	*	—	*	—	*	—
Hong Kong	12,209	+ 930	*	—	*	—	*	—
Australia	176,212	+ 54,477	58,349	+ 50,454	15,306	+ 6,725	26,671	+ 13,701
New Zealand	87,167	+ 31,125	*	—	8,382	− 5,934	13,286	− 3,090
Canada	16,681	+ 3,356	863	− 1,500	10,939	+ 2,347	6,914	+ 3,566
Other British Countries	74,931	+ 37,749	21,062	− 14,170	14,275	− 1,041	35,869	+ 9,354
Sweden	17,952	+ 1,616	*	—	*	—	*	—
Denmark	13,817	+ 2,882	*	—	*	—	*	—
Netherlands	12,910	+ 4,001	*	—	*	—	2,152	+ 984
Belgium	14,166	+ 525	*	—	*	—	*	—
France	14,685	+ 146	*	—	*	—	1,879	− 4,182
Portugal	7,456	− 1,754	*	—	*	—	*	—
Spain	7,792	+ 6,613	*	—	*	—	*	—
Italy	3,715	+ 3,715	*	—	*	—	*	—
Greece	7,215	+ 3,260	*	—	*	—	*	—
Rumania	24,300	+ 20,223	*	—	*	—	*	—
Egypt	6,665	+ 1,015	*	—	*	—	1,842	+ 1,364
China	5,230	− 571	*	—	*	—	—	− 2,581
Brazil	16,237	− 20,468	*	—	*	—	*	—
Argentina	42,678	− 9,316	*	—	*	—	1,332	+ 507
Other Foreign Countries	101,117	+ 15,185	10,383	− 2,310	40,381	+ 11,619	29,726	− 2,092
Total	£1,098,155	+ £251,805	£113,023	+ £18,308	£122,471	+ £23,457	£268,132	+ £55,034

* Not classified separately. Vacuum cleaners are not included in this table.

The Motor Show

Besides the standard electrical equipment a large number of useful accessories are on view

THE Minister of Transport's new anti-dazzle regulations which became operative this month have focused particular attention on headlamps at this year's Motor Show, now being held for the first time at Earls Court. In spite, however, of the large number of new lamps which make their first appearance, there appear to be few outstanding developments, the new models generally being modifications or adaptations of previous designs. The new Lucas "FT57," for instance, utilises the same principles as the company's previous "flat-topped beam" models (namely, a stepped reflector, shielded bulb and domed fluted front glass) but has a shallower contour which enables it to be fitted to the latest cars where space in front of the radiator and wings is restricted.

Lucas "Post-horn" wind-tone horns

In the latest "Raydyot Challenge" lamps (James Neale & Sons, Ltd.) a cowl is placed over the lamp and a partly frosted front glass used, while a new Eversure Accessories model obtains its anti-dazzle chracteristics from the special "split" design of its reflector.

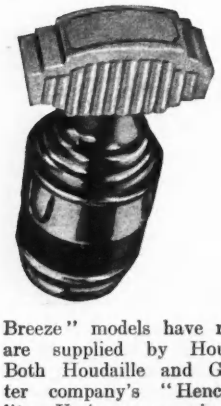
A new glass lens ensuring maximum distribution has been specially designed by Holophane, Ltd., for the modified Trippe "Safelite" (shown by Brown Bros., Cadisch and the East London Rubber Co.) which is guaranteed weatherproof and is shallower than its predecessor. A 30 per cent. increase in the width of the beam has been made possible in the latest Desmo "Safebeam" lamps by using a different type of front glass. Rain and falling snow are rendered invisible, it is claimed, by the golden lens used in the Notek lamp. A novel headlamp focusing screen for garage use is available at practically cost price from Ceag, Ltd.

In order that anti-dazzle lamps may operate efficiently it is essential that correctly designed types should be used. Both "Ediswan" and Rival Lamps make a strong point of this and Lucas have a special testing machine ensuring that no faulty lamps are used.

Recessed side lamps are being used to good effect on many cars. Enclosed number plates illuminated from behind are becoming more popular and there appears to be a demand for a lamp at the rear for backing. It is time something was done to standardise the form of the stop light.

Interior Improvements

Inside the cars, the speed limit has been responsible for the production of such items as Smith's "Thirtilite" and "Thirtilarm." The same company's cigarette lighter is already well-known and another type makes its appearance in the Haudaille Hydraulic Suspension Co.'s "Berkshire," fitted with an automatic cut-out.



The Houdaille "Berkshire" cigarette lighter

Car heaters which utilise the hot-water from the radiator system in conjunction with electric fans are to be seen in large numbers, Guiterman, Delco-Remy, Stadium, Barrus, Papélian and others showing them. Small fans, too, seem to be finding favour not only for keeping the windows free from mist but also for ventilating caravans. Both the Barrus "Samson" and the Guiterman "Auto-Breeze" models have rubber vanes, and other neat types are supplied by Houdaille and Feeny & Johnson. Both Houdaille and Guiterman have defrosters, the latter company's "Hencol-Mosco" being made of bakelite. Various new or improved windscreen wipers have made their appearance, among them Trico-Folberth and Lucas models, and we saw some cars with the wiper motor under the bonnet and the blades placed out of sight when they are not in use.

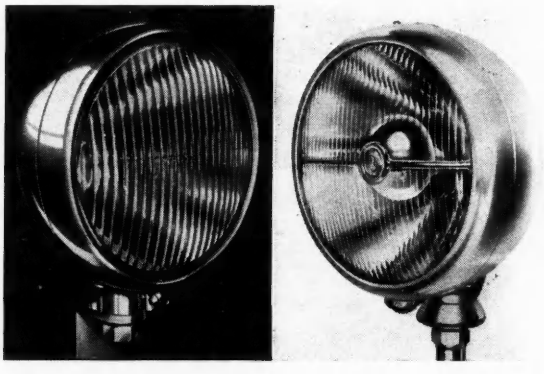
Research still continues to discover the most pleasant yet effective audible warning. On the Lucas stand visitors can, by means of earphones, compare the different types of "Mellotone" horns which are supplied in matched pairs and give alternative loud and soft signals. The latest Lucas model, the "Posthorn," has no provision for alternative notes. Three different notes are given by the Bosch multi-horn. Generally speaking all the higher-priced cars are fitted with twin horns as standard, more often than not on the exterior.

Radio has become a fairly common feature and we noticed one Rolls Royce with the controls recessed in the arm rest. Electrically operated vision windows are among a number of new and interesting applications of electricity in some of the more expensive cars. Delage models are now equipped with "Cotal" electric gearboxes which change gear by operating a switch.

Ignition and Battery Equipment

With regard to the electrical equipment of the car engines themselves one of the largest and most comprehensive displays is that of the British Thomson-Houston Co., Ltd., which shows magnetos of both rotating armature and polar inductor types, coil ignition equipments, electric speed indicators, impulse starters, automatic ignition timing devices, engine starters, flexible couplings and "Fabroil" gears. A new high-voltage coil by Delco-Remy is capable of 10,000 r.p.m. Lodge are distributing booklets containing hints on engine and plug maintenance. Tapered roller, ball and parallel roller bearings are exhibited by British Timken, Ltd.

Practically all batteries now bear a two years' guarantee. Features which struck us about the various makes were:—The new designs of the Oldham "Built to Last" heavy-duty starter batteries; easy fitting of the Peto & Radford "Dagenite" accumulators; the double separation in the Chloride "Exide Double Life" batteries; the method of locking the active material into the grids of the "Ediswan" models; the "Parbonite" separation of the Young range; the double grease cup terminals and the ebonite armouring of the positive plates of the Fuller products; the extra thick plates of the Britannia "Pertrix"; the strengthened plates of the Tungstone; and the rubber vent covers of the Lucas models. An added refinement to the Lucas compensated voltage control dynamo equipment, by the way, is thermostatic compensation.



The Trippe, "Safelite" and the Lucas "FT57" fog lamp and anti-dazzle "Passlight"

For home charging, Philips are introducing an exceptionally low-priced apparatus and Westinghouse are making a feature of their "Westric" trickle charger. "Ediswan" and Crypton also have home models. In addition, all these manufacturers show typical chargers for garage use.

Apart from the more conventional types of radiator heater such as the Hill "Neeta" heater and the Neale "Raydyot," G. T. Riches & Co., Ltd., show the "Limpet" model, which is actually an electric transformer in which the cylinder itself acts as a yoke, so causing heat to be generated.

A new type of lamp, the "Nearlite," which will find extensive use in factories, &c., as well as in garages, is shown for the first time by Stadium, Ltd. It securely grips any surface without damage, it has a protective skirt well insulated from the shade, and the lamp is on double ball joints. The same manufacturers also have an almost indestructible inspection lamp with a rubber handle. Smith's "Gripper" handlamps, Terry's "Anglepoise," the Neale "Magnalite" with magnetic

Business and Industrial Notes

The Week's News. Showrooms and Exhibitions. New Installations. Overseas Trade. Publicity Material. Trade Announcements. Prices of Materials. Liquidations and Bankruptcies.

A Commercial Lighting Fittings Showroom

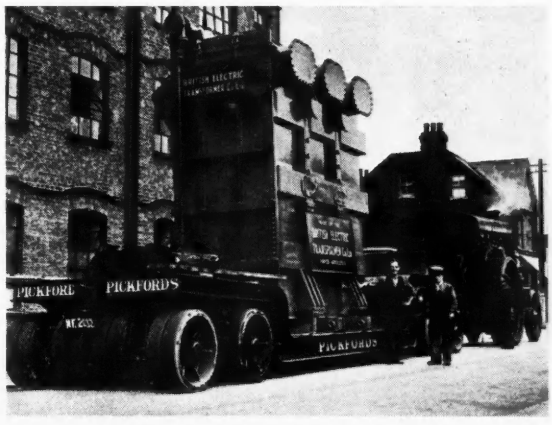
As a result of its recent removal to more commodious premises at Maidstone House, 26, Berners Street, London, W.1, Zeiss Ikon, Ltd., now has available for the display of commercial lighting fittings a well-equipped showroom more than double the size of its old one in Mortimer Street. One of the most useful new facilities provided at this showroom is that prospective purchasers are enabled to compare the actual effect of various types of fittings arranged at both 1- and 2-ft. centres without the necessity of having them installed in their own shop windows, showrooms, &c. The greater space available also allows a number of new fittings to be shown, including bench lights, trough lights, searchlights and the attractive "JZ 6, 7 and 8" pendant and ceiling models. Furthermore, the adjacent offices provide an opportunity for showing various types of fittings in appropriate settings, as, for example, in the boardroom, where the new decorative "DPL 8 and 9 Special" units are installed, These fittings, which are very suitable for large showrooms, &c., incorporate large glass circles, the glass of which can be tinted to harmonise with the decorative scheme of a room without in any way impairing the lighting efficiency. In his own office the manager of the Electrical Department, Mr. A. R. St. Clair, can demonstrate the advantages of indirect lighting units.

[Elec. Rev. photo.

The new commercial lighting fittings showroom of Zeiss Ikon, Ltd., at Maidstone House, Berners Street, W.1.

A Large Order

The accompanying illustration sent to us by Crompton Parkinson, Ltd., shows a 53,000-h.p., 66,000-V transformer leaving the Hayes factory of the British Electric Transformer Co., Ltd., for Deptford. Owing to the weight (113 tons) and size of the load special facilities for transportation had to be provided. The transformer was mounted on an 18-ton, 16-wheel wagon and was hauled by two 15-ton traction engines.



A large B.E.T. transformer leaving the company's works at Hayes

Works Visit

The Autumnal Conference of British Chambers of Commerce which was held at Manchester on October 14th-15th included an address by the Prime Minister at a banquet in the Midland Hotel on October 14th and visits to the Ship Canal and various factories, during which a number of the delegates visited the Trafford Park Works of the Metropolitan-Vickers Electrical Co., Ltd.

Engineering Apprentices and the Unions

A conference of representatives of the Engineering and Allied Employers' National Federation and of the engineering trade unions was held in London last week to discuss the question of the unions' right to negotiate terms and conditions of employment on behalf of apprentices in the engineering industry. This was one of the points upon which many thousand apprentices recently ceased work. At the conclusion of the meeting it was announced that the parties had come to an agreement. The employers' representatives are to recommend the Federation to agree in principle to the recognition of the right of the unions to negotiate on behalf of apprentices, boys and youths "subject to such reservations of machinery and scope as may be mutually agreed upon." On these terms the conference was adjourned for a month and the union representatives are to instruct their members that there shall be no stoppage of work or irregular action in relation to

The Motor Show (*Continued from previous page*)

base, and the "Barrus" two-reflector "Powerlite" are other outstanding equipment of this kind.

Practically all petrol pump manufacturers now make electric models recording the price per gallon, the "gallonage" and the total price of each sale. Avery-Hardoll, Wayne, Bowser, Stemco and Beck, have such apparatus, and Theo & Co. make a special feature of multiple electric pumps. There is a large demand to-day for electrically operated air compressors and we noticed that V. L. Churchill & Co., Ltd., have brought out some new vertical models.

Electric car lifts are a speciality of the Laycock Engineering Co., who also make car washers, as do Mann Egerton, Simpkins and Tangyes. Various new models of garage pressure cleansing tanks are shown by Mann Egerton. A useful appliance for cleaning car interiors, the electric "Vac-Kar," is a Black & Decker product.

Quick location of faults is an invaluable asset to the garage proprietor and that is where such apparatus as Crypton, Pickavant, Allied Motor Components and the Autocar Electrical Equipment Co. offer is so useful. Cracks in iron and steel can be rapidly detected by the Equipment & Engineering Co.'s "Magnaflux" apparatus, while tests for inefficient or badly adjusted brakes are speedily effected by the "Bendix-Cowdrey" electrically driven dynamic brake tester. Demonstrations of an electric vulcanising process for repairing tyre tubes and covers are given by L. Steiner, and the British Oxygen Co. shows welding and cutting plant.

Reduction of weight is the principal development in electric tools which are shown in profusion by Rotax, Wolf, Bosch, Micox, Lindley, B.E.N., Grimston, Black & Decker, and Desoutter. Flexible shaft equipment, such as Grimston and B.E.N. make, is finding favour.

Appreciating the value from the sales point of view of a brightly illuminated garage both inside and out, Benjamin are making a special feature of their "Duoflux" floodlights, the "Ile" reflector for the illumination of petrol pump islands, and industrial lighting reflectors.

In the Motor Boat and Marine Engine Section, Arthur Bray is showing the "Bendix Eclipse" electric outboard motor which will run for seven hours at high speed or 14/20 hours at low, using 6- or 12-V car type batteries. It is fitted with a reverse gear and weighs 20 lb.

Various types of generating sets are shown by Ruston & Hornsby, the National Gas & Oil Engine Co., Stuart Turner, Barrus and others, while demonstrations of "Bee" pumping sets for yachts working on a 12-V battery are given by Graham Bunn.

A typical marine lighting installation, a marine wireless battery and various types of nickel cadmium alkaline accumulators, are interesting items of the exhibit of Batteries, Ltd., which, like C.A.V.-Bosch, is also showing portable floodlight sets. Applications of electrical reverse gear conrols to various types of petrol, paraffin and Diesel power units are demonstrated by Mathway Marine Installations.

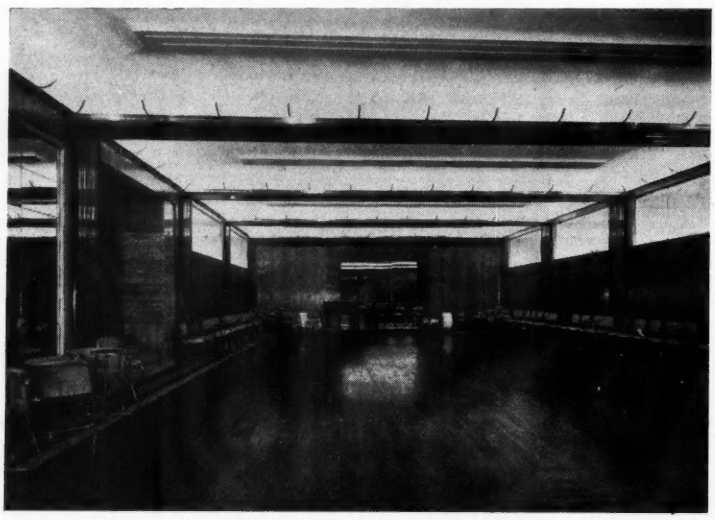
The exhibition closes to-morrow (Saturday).

these matters while they are under consideration. At a separate meeting between the Federation representatives and A.E.U. delegates a similar agreement was arrived at. This meeting was necessary because the A.E.U. has decided not to join the new Confederation of Engineering and Shipbuilding Unions and the Foundry Workers.

Eight hundred engineering apprentices employed by Johnson & Phillips, Ltd., Greenwich, and Siemens Bros. & Co., Ltd., Woolwich, came out on strike this week. Mr. F. Smith, general secretary of the A.E.U., stated that the dispute had not been officially reported to the union and therefore the executive council had had no opportunity of dealing with it. The action of the apprentices was unofficial.

A Battery Luncheon

The annual "Exide" luncheon held in connection with the Motor Show took place on October 14th at the Clarendon Restaurant, Hammersmith. Mr. D. P. Dunne, managing director of the Chloride Electrical Storage Co., Ltd., presided as usual, and entertained the company with one of his speeches flavoured with dry humour. In proposing the health of the guests, he said he could not claim that the company had made marvellous progress, but it had continued its steady upward movement during the past year. After a humorous reference to the company's research staff he said that wonderful new electrolytes continued to make their appearance. They had found, however, that the electrolyte consisting mainly of distilled water with a certain quantity of sulphuric acid gave the best results. More sulphuric acid acted as a temporary stimulant, but the ultimate effect was adverse. The toast was responded to by Mr. R. Acland, M.P., and Mr. S. C. H. Davies (*The Autocar*). The latter quoted examples of the drastic treatment given to car batteries by some drivers who, of course, blamed the batteries for the results.



The ballroom of Macvitties, Guest & Co., Ltd., Edinburgh

London's Two Dairy Shows

This week two dairy shows are being held in London, that of the British Dairy Farmers' Association at the Royal Agricultural Hall, Islington, and that of the National Dairymen's Association at Olympia. They close this (Friday) evening and a review of the electrical equipment shown will appear in our next week's issue.

Partly in connection with the Agricultural Hall Show the British Dairy Farmers' Association, in conjunction with the British Electrical Development Association, has staged a small exhibit at Charing Cross Underground Station to show the applications of electricity to dairy and poultry farms. A Gascoigne milking machine, Coldair direct expansion cooling plant, a Wessex Supplies bottle washer, a G.E.C. sterilising chest and a Coldair ice-cream freezer form a representative selection of dairy equipment. On the poultry side great interest is being aroused by the actual hatching of chicks in Curfew incubators. Demonstrations are given of egg candling and grading. The exhibit will probably remain on view until October 30th. Pictures appear on page 578.

Registered Electrical Contractors

The Executive Committee of the National Register of Electrical Installation Contractors at its last meeting accepted the following applications for registration:—

Schofield & Tanner, Denton, Manchester.
L. Dixon, East Didsbury, Manchester.
H. B. Hewitson, Urmston, Manchester.
F. W. Birkett & Sons, Ltd., Cleckheaton.
Aston & Bolton, Banbury.
Boroughbridge Electrical Co., Ltd., Horsefair, Boroughbridge.
Langtons, Tonbridge.
H. A. Stonham, Tunbridge Wells
Lear Bros., Bath.

At the same meeting nine applications were declined.

Appeal to Reyrolle Men

Mr. G. H. Pawsey, of Doric House, Hebburn-on-Tyne, asks us to appeal to all past and present employés of Messrs. A. Reyrolle & Co., Ltd., for subscriptions to a fund which is being raised on behalf of Ellison Hall Infirmary, Hebburn-on-Tyne, where many Reyrolle men have received treatment. Mr. Pawsey has been appointed one of the appeal secretaries (Mr. J. Jex-Long is the other) and as a Reyrolle man himself, he is trying to raise £2,500 during the next two years towards extensions and alterations costing £10,000. The Commissioner for Special Areas has granted £7,500.

A Restaurant Lighting Installation

The new suites recently erected by Macvitties, Guest & Co., Ltd., of Edinburgh, are notable for their illumination due to co-operation between the architects, Cairns & Ford, of Edinburgh, the builder, decorator and the lighting consultants. The architects selected G.V.D. Illuminators, Ltd., as the lighting consultants. Throughout the whole scheme electricity consumption is considerably lower than would normally be necessary, and the average spacing of ordinary gas-filled lamps is three feet. The impression given by the lighting throughout the building is one of luxury and warmth. Although indirect or semi-indirect lighting has been used, in no two rooms is exactly the same method adopted. For instance, in the ballroom (shown in the accompanying illustration) the ceiling is divided into a series of bays providing a perfect background for decorative lighting. Each bay is surrounded on all sides by cornice lighting, the cornice lip being extended by bent glass panels. Windows admitting daylight are provided on one side of the room only, and both these and the artificial windows on the other side to match are illuminated in the same manner at night-time. In the restaurant a central beam running the whole length of the room with a coffered ceiling above provides the illumination. One lamp every three feet installed in the metal trough provides indirect lighting, while lamps at the same spacing add the necessary sparkle to the scheme by direct illumination through the glass soffit. This central beam also provides concealment for the ventilation system. The windows on each side of the room are treated in exactly the same way as in the ball-room. The rest of the apartments has also been specially treated.

Ipswich Electrical Exhibition

The Ipswich and District Electrical Association was formed six years ago for mutual assistance to all those in the electrical industry and not merely as a means of propaganda. Monthly meetings, lectures and a joint advertising campaign have already made the Association well known in East Anglia among the public as well as engineers, so it was with confidence the first electrical exhibition was opened on October 20th at the Ipswich Corporation Electricity Department's showrooms, where it will continue until October 30th. Over thirty well-known firms, most of which have branch offices in Ipswich, and therefore are members of the Association, are exhibiting, and their products are grouped together to form collective exhibits. A typical kitchen, bathroom, dining and bedroom have been built up, and demonstrations are being given. An inaugural exhibition luncheon was given by the Association on October 20th to local architects and builders at which a talk was given by Miss C. Haslett on "Kitchen Planning," after which the exhibition was opened by the Mayor of Ipswich. An exhibition dance is being held to-day (Friday).

G.E.C. Branch Extensions

Considerable structural alterations have recently been undertaken at Magnet House, Gallowgate, Newcastle-on-Tyne, the north-eastern branch headquarters of the General Electric

A selection of electric fires which forms part of the autumn window display of the General Electric Co., Ltd., at Magnet House, Newcastle

Co., Ltd. These premises were taken over by the company in 1909, and from time to time extensions have been made to cope with the increasing business and the demands for space for stocks. Now, as a result of drastic alterations and further extensions, the branch has available a floor area of 22,496 sq. ft. of which 10,045 sq. ft. is devoted to stockrooms. Laid out on modern lines this space is deemed ample, for some time to come, for all administration, showroom and stockroom purposes. The staff at this branch totals 111. Mr. Horsfall, the manager, has been in control since 1922.

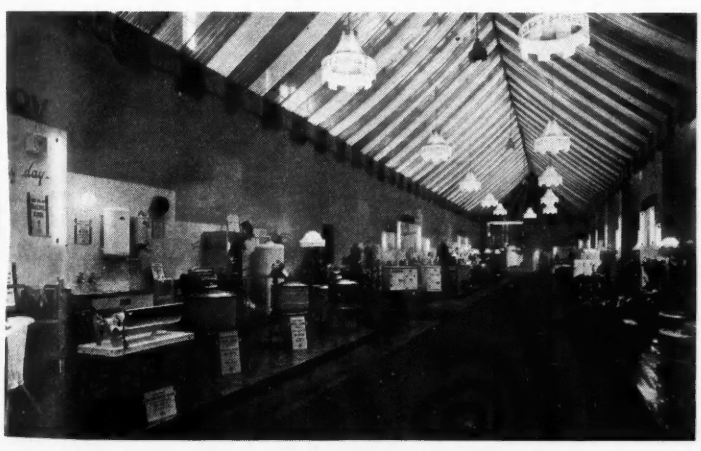
Social Events

On October 14th the Northmet Sports Association (North Metropolitan Electric Power Supply Co.) held its first swimming gala at Wood Green, over 500 club members and friends attending. The team championship was won by Tottenham, with Northmet House a close second, and Mr. Miller (Wembley) and Miss J. Hendry (Edgware) were the respective winners of the men's and ladies' championships. Variety was introduced by two members of the Hammersmith Ladies' Swimming Club, who gave an exhibition of ornamental and trick swimming, and by the *Daily Sketch* life-saving team. A polo match between the Club and the Tottenham and District Gas Co. gave electricity yet another chance to "put one over" on gas. Prizes were presented by Capt. J. M. Donaldson, M.C. (chief engineer to the company). Among others present were Messrs. C. J. Spencer (director), E. Boys (secretary) and J. J. Gibbons (assistant secretary).

On October 9th the workpeople of M.C.L. & Repetition, Ltd., held their works outing, when a visit was paid to Blackpool to see the illuminations.

Home Lighting

The first session of the thirty-sixth Illumination Design Course was opened on October 11th under the chairmanship of Mr. L. E. Buckell (chairman of the E.L.M.A. Lighting Service Bureau Committee), when Mr. W. J. Jones gave a lecture on "Better Light—Better Sight in the Home." Mr. Jones pointed out that on the assumption that the average consumer uses 150-200 kWh per annum, the revenue of the domestic lighting load to supply interests was £15,000,000 per annum. During his tour of the United States he found that the average consumption per consumer was twice that in this country. A change from a 60-W to 100-W lamp meant an increased annual consumption of 40 kWh, and in the Greater London area alone an increase of 45,600,000 kWh per annum. At 1d. per kWh this meant an increased revenue of £190,000 per annum, involving an extra expenditure on lamps of only £38,000, which compared favourably with other fields of development. Mr. Jones then outlined sales suggestions for use in selling lighting, touching on co-operation with the building trades and the need for the provision of better facilities in the way of plug points. He suggested the use of reminder cards asking consumers if they had sufficient supplies of lamps and general lighting equipment. Referring to his tour of the United States, Mr. Jones mentioned the system of sending home lighting advisers to establish contact with each household. From experiments made in this country there



The Northmet Pavilion at the North London Exhibition

was every reason to believe that a similar service could be developed. A discussion followed which was opened by Mr. J. S. Dow.

Our Special Domestic Issue

The Hoover vacuum cleaner illustrated on page 487 was the model "825," not the "Junior" as stated.

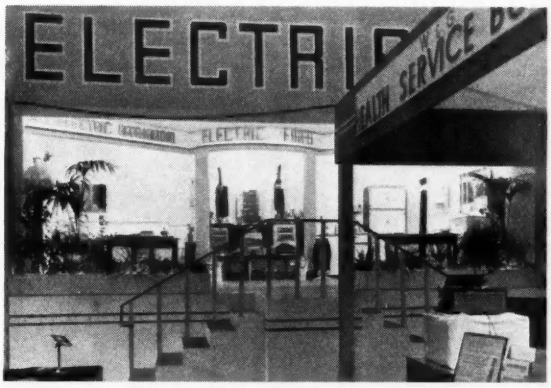
Sun-Vic Controls, Ltd., inform us that their address is now 1, Kingsway, London, W.C.2, and not as given on page 497.

Leipzig Fair

The engineering and building fair, held under the auspices of the Leipzig Spring Fair, 1938, is to open on March 6th, and will continue until March 14th. The general samples section, which also opens on March 6th, closes on March 11th.

Hammersmith Health Exhibition

The Hammersmith Electricity Department has been holding the stage in more senses than one this week at the Town Hall where a health week and exhibition have been organised.



The Hammersmith Electricity Department's exhibit at a local health week and exhibition [*Elec. Rev. photo.*

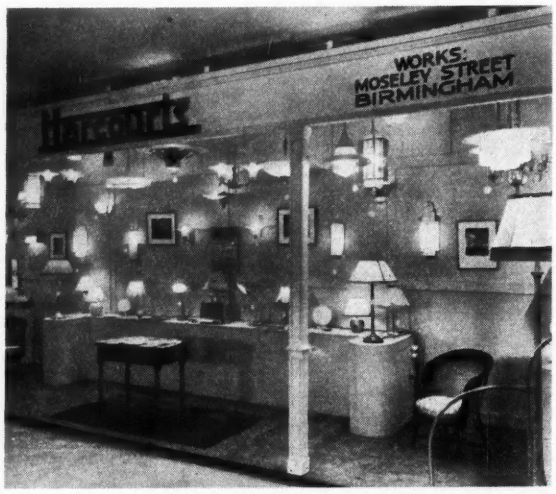
Great interest is being evinced in its attractively arranged exhibit, which includes as its main features an all-electric kitchen and bathroom with a centrepiece of some of the fires which are available for hire or hire purchase. The cleanliness and other hygienic qualities of electric cooking are emphasised at demonstrations which are held every afternoon and evening. Gifts of irons or toasters are made to the holders of lucky tickets, and the persons who guess most nearly the consumption of electricity recorded on a hidden meter are presented with the food cooked. The opportunity is being taken to make known a novel prepayment electricity tariff introduced a short time ago with a view to popularising the use of apparatus, other than lighting, for which the Department offers attractive hire and hire-purchase facilities. Under this rate a pre-arranged number of kWh each week, varying according to the apparatus and wiring supplied by the Council, is supplied at 3d. per kWh and the remainder at ½d. per kWh. The exhibition remains open until to-morrow evening.

North London Exhibition

One of the most attractive exhibits at the North London Exhibition, now in progress at the Alexandra Palace, is once again the North Metropolitan Electric Power Supply Co.'s electric pavilion. Following upon its success of last year the pavilion, covering an area of approximately 50 yards by 10 yards, gives the public yet another opportunity of viewing a comprehensive display of electrical equipment and apparatus designed to alleviate labour in the home. Separate sections are devoted to electric fires, vacuum cleaners, refrigerators, water heaters, home laundry equipment, cooking equipment, and a host of other electrical devices, including electric irons, toasters, clocks, percolators, air circulators, fans, hair dryers, and lamp standards. Among the lighting fittings "figure" table lamps are attracting much attention. A demonstration of electric sewing machines is also given in another section of the Pavilion. On the water-heating stand evidence is given of the growing popularity of the use of electricity for heating water and of the number of conversions to electricity that are being undertaken of old-type water-heating systems in the home. In the separate electrical exhibits in the main halls Stokes Appliances, Ltd., is demonstrating its electric table cooker and warming plate; and the Hurley Machine Co. (England), Ltd., is showing "Thor" electric vacuum cleaners, washers and wringers and ironers. Vacuum cleaners are also displayed by the British Vacuum Cleaner and Engineering Co. (which, on a separate stand, exhibits "Goblin" electric washers and clocks); New Welbeck, Ltd.; Tellus Super Vacuum Cleaner, Ltd.; and Harles (Hotpoint). Beatty Bros., Ltd., are featuring home laundry equipment, and electric sewing machines are being exhibited by the Singer Sales Department (also electric clocks and irons), and the Columbia Machine Co. A special feature of this year's exhibition is the National Milk Publicity Council's exhibit, which shows by means of paintings and apparatus how London obtains its milk supply. Here electricity is used extensively, the equipment including electric milking appliances by Alfa-Laval Co.; cold-room apparatus by Frigidaire, Ltd.; bottle-filling machinery by Graham-Enock Manufacturing Co.; and bottle washing and heat exchanging equipment by U.D. Engineering Co. An electric vehicle suitable for door-to-door milk delivery is shown in connection with this exhibit by Clecolectric Vehicles, Ltd. of Leicester. The exhibition continues until the end of this month.

Tunbridge Wells Electrical Exhibition

One of the many attractive features at the recent electrical exhibition held in Tunbridge Wells was the stand of Harcourts, Ltd., on the ground floor, on which were displayed examples of period lighting fittings, and some of their latest



The stand of Harcourts, Ltd., at the recent Tunbridge Wells Electrical Exhibition

designs in fittings to conform with the modern trend in decorative and furnishing schemes. The accompanying illustration shows the general layout of the various fittings, which include "Heatlite" suspension units and floor standards.

Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances :—

CHEMICALS, ETC.	Price. October 20th	Fortnight's Inc. or dec.
a Acid Oxalic ... ... per cwt.	50s.	—
a Ammoniac, Sal ... ... per ton	£36	—
a Ammonia, Muriate (large crystal)... ,,	£18 10s.	—
a Borax ... ... ,,	£17	—
a Copper, Sulphate ... ... ,,	£22 10s.	—
a Potash, Chlorate ... ... per lb.	3½d. to 4½d.	—
a ,, Perchlorate ... ... ,,	6d.	—
a Shellac ... ... per cwt.	£4 18s.	—
a Sulphur, Commercial ... ... per ton	£11	—
a ,, Roll ... ... ,,	£11	—
a Soda, Chlorate ... ... per lb.	3¼d. to 3¾d.	—
a ,, Crystals ... ... per ton	£5 to £5 5s.	—
a Sodium Bichromate, casks ... ... per lb.	4d. net.	—
METALS, ETC.		
b Aluminium, Ingots ... ... per ton	£100 to £105	—
b ,, Wire ... ... per lb.	1/1 to 1/9	—
b ,, Sheet and Foil ... ... ,,	1/3 to 2/9	—
p Babbitts Metal and Anti-friction Metals—		
Grade I ... ... per ton net	£211	£16 dec.
Grade II ... ... ,,	£148	£9 dec.
Grade III... ... ... ,,	£84	—
c Brass (rolled metal 2" to 12" basis)... per lb.	8¼d.	¼d. dec.
c ,, Tubes (solid drawn) ... ... ,,	11¼d. to 11¾d.	¼d. dec.
c ,, Wire, basis ... ... ,,	8¾d.	¼d. dec.
c Copper Tubes (solid drawn) ... ,,	1/1	¼d. dec.
g ,, Bars (best selected) ... per ton	£84	£3 dec.
g ,, Sheet... ... ... ,,		
g ,, Rod ... ... ,,		
d ,, (Electrolytic) Bars ... ... ,,	£49	£8 dec.
d ,, ,, Wire Rods ... ,,	£54 10s.	£7 dec.
d ,, ,, H.C. Wire ... per lb.	9¼d.	¼d. inc.
f Ebonite Rod ¼" dia. & up ... ... ,,	1/10 to 2/5	—
f ,, Sheet ⅛" thick & up ... ... ,,	1/5 to 1/10	—
n German Silver Wire, Nos. 1 to 12... ,,	2/5	—
h Gutta-percha fine ... ... ,,	nom.	—
h India-rubber, Para-fine ... ... ,,	9d.	¼d. dec.
i Iron, Pig (Cleveland, No. 3) ... per ton	£4 5s.	—
i ,, Wire galv. No. 1, P.O. Qual.... ,,	£23	—
g Lead, English Pig ... ... ,,	£19 10s.	£1 15s. dec.
g Mercury ... ... per bot.	£13 5s.	5s. dec.
e Mica (in original cases) small ... per lb.	10d. to 2/-	—
e ,, ,, ,, medium ... ,,	6/- to 12/6	—
e ,, ,, ,, large ... ,,	13/- to 17/6 up	—
p Phosphor Bronze, plain castings ... ,,	1/3½	—
p ,, ,, drawn bars & rods ,,	1/2½	½d. dec.
p ,, ,, rolled strip & sheet ,,	1/0	½d. dec.
p ,, ,, wire ... ... ,,	1/2	½d. dec.
o Platinum ... ... per oz.	£9 10s.	15s. dec.
d Silicium Bronze Wire ... ... per lb.	9|d.	½d. dec.
g Speiter ... ... per ton	£16 13s. 9d.	£26s. 3d. dec.
r Steel, Magnet, in bars ... ... per lb.	7¾d.	—
g Tin, Block (English) ... ... per ton	£206 15s.	£36 5s. dec.
n ,, Wire, Nos. 1 to 16 ... ... per lb.	4/3	—

Quotations supplied by :—

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India Rubber, Gutta Percha and Telegraph Works Co., Ltd.
g Henry Gardner & Co., Ltd.
h Edward Till & Co.
i Bolling & Lowe.
n P. Ormiston & Sons.
o Johnson Matthey & Co.
p C. Clifford & Sons, Ltd.
r W. F. Dennis & Co.

The above table is published here fortnightly. In alternate issues, in which it does not appear, the latest prices of copper, silicium bronze wire, lead, rubber, tin and spelter, up to the time of going to press, are given in our "Business Notes" under the same heading.

Trade Announcements

The Bodine Electric Manufacturing Co. has appointed Power Contracts (Batwin), Ltd., as sole distributors of its complete line of small series-wound shaded-pole, capacitor and split-phase motors from 1/200th to ¼ h.p.

The Universal Lamp Co. is opening a showroom at Universal House, 23, Rochdale Road, Manchester, 4, for the display of British and American fittings, fires, &c.

New Catalogues and Lists

Lightfoot Refrigeration Co., Ltd., Bush House, Strand, Aldwych, London, W.C.2.—A broadsheet with prices and specifications of "Westinghouse" domestic appliances.

Gordon Equipments, Ltd., 25, Milton Street, London, E.C.2.—A catalogue of battery shop tools and general garage equipment.

Typerlite Co., 86, Cannon Street, London, E.C.4.—A catalogue of adjustable lighting fittings.

Non-Ferrous Die Casting Co., Ltd., Nonferdica Works, North Circular Road, London, N.W.2.—An illustrated booklet dealing with die casting.

Marconi-Ekco Instruments, Ltd., Electra House, Victoria Embankment, London, W.C.2.—Leaflets describing a new noise meter and an inductance test set.

W. Edwards & Co., Allendale Works, Vaughan Road, Loughboro' Junction, London, S.E.5.—Details of instruments for the measurement of high vacua.

Cooper & Smith, 94, Charlotte Street, London, W.1.—Sheets 77 and 78 illustrating lighting fittings.

Carron Company, Carron.—A catalogue of new season's fires.

Young & Wildsmith, Ltd., 35, Little Russell Street, New Oxford Street, London, W.C.1.—A 28-page catalogue of electric fires.

Lighting Trades, Ltd., 51/55, Garratt Lane, Wandsworth, London, S.W.18.—Catalogues of electric fires and domestic appliances and shades for electric lighting.

A. Reyrolle & Co., Ltd., Hebburn-on-Tyne.—Catalogue sections dealing with house service cartridge fuses, universal cartridge fuses, fuse links, low-voltage transformers, a.c. switchboard instruments and underground lighting joint box transformers.

L. G. Hawkins & Co., Ltd., 30/35, Drury Lane, Kingsway, London, W.C.2.—A broadsheet illustrating "Sunray Tricity" and "Supreme" fires.

Ateliers de Constructions Electriques de Charleroi, Victoria Street, London, S.W.1.—A stock list of materials for October.

Crompton Parkinson, Ltd., Bush House, Kingsway, London, W.C.2.—A catalogue of "Crompton" electric-discharge lamps and fittings.

Benjamin Electric, Ltd., Brantwood Works, Tariff Road, Tottenham, London, N.17.—A publication dealing with lighting entitled "Why Benjamin?"

Ferranti, Ltd., Radio Works, Moston, Manchester, 10.—A booklet which deals with the company's triode output high-quality radio receivers.

Eltron, Ltd., Salisbury Square House, London, E.C.4.—Details of an improved 1½-gal. hot-water storage tank and an immersion heater for rapid boiling.

General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2.—A leaflet on stencilled metal designs for architectural lamps.

Veritys, Ltd., Plume and Victoria Works, Aston, Birmingham, 6.—A well illustrated catalogue (No. 1153, 144 pages) dealing with "Maxlume" modern industrial and commercial lighting.

British Insulated Cables, Ltd., Prescot.—New catalogues of "Rockbestos" a.v.c cables and an 81-page booklet entitled "B.I. wiring systems."

Bankruptcy Proceedings

F. G. Arthurton, Gordon Avenue, Thorpe St. Andrew, Norfolk, lately carrying on business at 16, St. Stephen's Street, Norwich, and 11, Market Row, Great Yarmouth, formerly radio dealer.—The first meeting of creditors was held at the Official Receiver's Office, Castle Chambers, Opie Street, Norwich, when a statement of affairs was submitted showing ranking liabilities of £66 and a similar deficiency. The case, being a summary one, was left in the hands of the Official Receiver, as trustee.

E. A. Cartwright, 8, Heskey Street, Nottingham, lately 71, Melton Road, West Bridgford, radio dealer.—The first meeting of creditors was held at the Official Receiver's Office, Nottingham, on October 15th, when it was reported that the deficiency amounted to £674. Debtor said that his failure was due to inexperience of the financial side of the business, lack of capital, and inadequate turnover having regard to heavy expenses. The matter was left in the hands of the Official Receiver, as trustee.

A. C. Hall, 65, St. Thomas's Road, Worthing, electrician.—The first meeting of creditors was held on October 13th at the Official Receiver's Offices, 8, Old Steine, Brighton, when a statement of affairs was produced showing gross liabilities of £759, of which £243 was expected to rank for dividend, and net assets of £104, leaving a deficiency amounting to £139. Debtor attributed his failure to competition and underestimating. The case being a summary one, was left in the hands of the Official Receiver, as trustee.

E. Cohen (Manor Wireless Supplies), radio dealer, 746B, Romford Road, Manor Park, E.—Application for discharge to be heard on November 3rd at Bankruptcy Buildings, Carey Street, W.C.2.

F. J. Couchman, radio and electrical engineer, 1, High Street, Sturry, Kent.—Trustee, Mr. F. C. Wells, 1, The Parade, Canterbury, Official Receiver, released September 30th.

H. G. Hayward (Modern Electric Service), electrical engineer and radio dealer, 42, Wilton Avenue, Southampton, lately trading at Cambridge Road, and formerly carrying on business at 186, Bitterne Road, Bitterne Park, Southampton.—Last day for receiving proofs for dividend October 27th. Trustee, Mr. A. L. Medcalf, 10, Rockstone Place, Southampton.

J. O. Storey (J. Storey & Son), electrical engineer and radio dealer, 227, Stockport Road, Ashton-under-Lyne.—First and

final dividend of 20s. in the £, and 4 per cent. statutory interest, payable October 23rd at the Official Receiver's Office, Byrom Street, Manchester.

G. Howarth, radio engineer, 36, Union Street, Bury.—First and final dividend of 2s. 0½d. in the £, payable October 22nd at the Official Receiver's Office, Byrom Street, Manchester.

F. L. Wainwright, radio dealer, 114, Kimbolton Road, Copnor, Portsmouth, lately carrying on business at 42, South Street, Yeovil.—First and final dividend of 9¼d. in the £, payable October 19th at 87, High Street, Portsmouth.

Nottingham Crystal Twinlight Co., electric lamp dealers, 11, Bilbie Street, Nottingham.—Receiving order made October 11th on a creditor's petition.

R. A. Robinson, radio and electrical engineer, 287, Upper Street, Islington, N.1.—Trustee, Mr. C. B. Park, Carey Street, W.C.2, Official Receiver, released October 5th.

F. W. Albinson, formerly electrical engineer, now journeyman, 73, Stanton Road, Sandiacre, Derby.—Trustee, Mr. A. J. Roger, 22, Regent Street, Park Row, Nottingham, Official Receiver, released October 6th.

G. H. Vardy (Vardy's Radio Service), radio engineer, 18, Catherine Street, Mansfield Woodhouse.—Trustee, Mr. A. J. Rogers, 22, Regent Street, Park Row, Nottingham, Official Receiver, released October 6th.

J. Conlon, electrical engineer, 18, Buckingham Street, Hull.—Last day for receiving proofs for dividend October 30th. Trustee, Mr. J. E. D. Stickney, 1, Parliament Street, Hull, Official Receiver.

Company Liquidations

Delabole Electric Lighting & Supply Co., Ltd.—Particulars of claims to the liquidator, Mr. A. J. Kellow, Fore Street, Camelford, Cornwall, by October 30th.

Standard Rediffusion Services, Ltd.—Meeting November 15th at Bush House. Aldwych, W.C.2, to receive an account of the winding-up by the liquidator, Mr. W. C. Thornton Cran.

Private Arrangement

N. MacHenry, radio dealer, trading as William MacHenry, 16, Castle Street, Lisburn, Northern Ireland.—The creditors met recently, when the statement of affairs showed ranking liabilities of £706, of which £478 was due to unsecured creditors and £228 to the bank. The net assets were £339, leaving a deficiency of £367. An offer was made of a composition of 10s. in the £, which it was decided should be accepted.

Dissolutions of Partnerships

Longley & Bennett, electrical engineers, 9, Thurlow Road, Worthing.—Messrs. A. Longley and F. H. Bennett have dissolved partnership. Mr. Longley will attend to debts and carry on the business.

John Harvey & Son, electrical and radio dealers, water and gas engineers, &c., 88, Kimberley Road, Aylestone Road, and 174, Mill Road, Cambridge.—Messrs. H. S. Harvey and J. T. Harvey have dissolved partnership. Mr. J. T. Harvey will attend to debts and carry on the business.

New Willesden Showrooms and Offices

TO-MORROW (Saturday) the new offices and showrooms of the Willesden Electricity Department are to be opened by Mr. J. M. Kennedy (Electricity Commissioner). The design of the building is modern and striking. It has a frontage of 74 ft. and a mean depth of 90 ft., and comprises basement, ground and first floors, and a second floor which extends at present only over the front portion of the building, permitting extension in the future. The principal rooms are panelled with Empire hardwoods and are floored with compressed cork on a concrete foundation. Maple wood flooring is employed elsewhere throughout the building.

The heating of the showrooms and offices is by means of radiators supplied with electrically heated water from a central boiler on the thermal-storage system. The electrode boiler is placed alongside a 4,000-gal. container, to which it is connected. A pump is incorporated for circulation and operation is controlled by a time switch. The hot water circulates throughout the building by the usual thermo-syphonic action, which is speeded up during very cold weather by a small electrically driven pump. Means are provided for automatically mixing a varying portion of the cooled water in the return pipes with the hot water from the container, thus maintaining an even temperature in the building throughout the day.

The lounge waiting-room is panelled in Tasmanian black wood. Callers will find a complete range of pamphlets descriptive of electrical apparatus, together with current issues of periodicals of interest to electricity consumers. Local and telephone directories, railway and tube guides, and other literature of local interest will also be available. A telephone call box is also provided.

The main showroom, which is panelled in Australian walnut, is provided with one small counter for the payment of accounts only. This is remote from the entrance, so that consumers will see the various exhibits of electrical appliances as they pass in and out. The tables for the showroom

assistants are placed at intervals along the sides of the room to enable them to deal individually with inquirers. A small interview room is provided adjacent to the cashier's counter.

In addition to the ordinary lighting, a demonstration of neon-type coloured lighting is provided in the centre of the room. Concealed in a cornice are three neon tubes coloured red, green and blue, the combination of which gives an approximation to daylight. A novel type of push-button control of regulators enables various colour effects to be obtained. Space for the display of the larger electrical appliances such as cookers, refrigerators, washers, together with the range of articles which are available for hire, is provided in the showroom annexe. The display of lighting pendants has been arranged with a cord-operated ceiling switch at each fitting. It will also have the usual demonstration cabinets. The demonstration room has been designed principally for cookery demonstrations. At the rear is a model electric kitchen specially laid out by Mr. J. D. Spark, the borough electrical engineer, for compactness to avoid walking to and fro. It measures only 14 ft. by 7 ft. 9 in. and contains kitchen cabinet, table, cooker, sink, wash-boiler, water heater, refrigerator and service trolley. There are also cupboards to accommodate crockery and cooking utensils.

The offices are on the first and second floors. The ladies' rest room has a small electric cooker, which is cleverly concealed when not in use.

In the basement the whole of the electric boiler equipment, electric lift mechanism and control gear, ventilation

A general view of the Willesden offices and showrooms; and (below) the main showroom showing the concealed neon lighting in the ceiling

plant, intercommunication automatic telephone relays, main switchboard and remotely operated neon lighting regulator have been arranged and displayed so as to provide a permanent exhibit, glass cases being used wherever possible. A high-voltage transformer sub-station is also installed in the basement and supplies the immediate surrounding area. A glass-panelled door enables this to be placed on view from the boiler house.

Projectors for sodium-type discharge lamps have been installed for the floodlighting of the building, and the tower is also illuminated from the inside by a novel arrangement of revolving coloured lighting which was designed and manufactured by the Department.

The architect for the building was Mr. F. Wilkinson, the construction being under the supervision of the borough engineer and surveyor, Mr. F. Wayman Brown. The main contractors were Messrs. Melville Dundas and Whitson, Ltd. The whole of the electric lighting and power installations, together with the design and construction of main switchboard and electrode boiler control panels, &c., was carried out by the Electricity Department's staff under Mr. J. D. Spark.

Electricity Supply

Lighting, Domestic, Power

Ashton-under-Lyne.—Street Lighting.—Sanction has been received by the Council to a loan of £2,000 to cover the cost of works to be executed in the first year of the Council's five-year programme of street lighting, and to a further loan of £1,250 for street lighting on the Smallshaw and Hurst Hall estates and in Hutton Avenue, Douglas Street and Pottinger Street.

Ayrshire.—Board's Report.—Considerably more capital expenditure was incurred by the Ayrshire Electricity Board during the year ended May 21st last than in the previous twelve months (£94,705 against £66,111), much of the increase being due to extensions of main transmission lines and underground cables. Actually, sixty miles of underground cable was laid and fifteen miles of overhead transmission and distribution lines erected. Substantial progress was made in the development of the rural areas. Sixty additional farms were connected during the period under review, while altogether new rural consumers numbered 1,464. Owing to the heavy capital expenditure necessitated by such supplies, however, quite a number of the rural schemes are not yet remunerative, according to the engineer and general manager (Mr. W. C. Bexon). In the whole of the area the number of consumers rose by 4,244 to 39,858, sales of energy increasing by 17 per cent. to 84 million kWh. On the operation side, it is noteworthy that losses on transmission lines, &c., were reduced from 5.1 to 4.0 million kWh, and the percentage losses were only 7.27. The Board's revenue totalled £371,160 (£340,309 in 1935-36), working expenses £248,439 (£222,127), and £6,886 (£3,856) was carried forward after £7,000 (£13,000) had been allocated to reserve.

Barnes.—Electricity for Water Board.—In connection with the provision of electrically driven machinery at the Barnes works of the Metropolitan Water Board the Barnes Corporation is to lay a cable at a cost of about £280.

Bedford.—Rural Demonstration Scheme.—The net result for 1936-37 was a loss of £2,423, compared with a deficit of £6,520 in the previous year. This was the first time since the inception of the scheme that the extent of the loss was reduced, and Mr. R. W. L. Phillips, the borough electrical engineer, states that there is every prospect that within the next two or three years the scheme will be working at a profit. In fact, if the advantage accruing to the whole undertaking by reason of the reduced price paid for electricity on account of the increased kWh purchased is taken into consideration the scheme may already be said to be self-supporting. Mr. Phillips regards the result as highly satisfactory and due to continuous development. Electricity in the countryside has passed the stage where it was a novelty, he says, and it is generally recognised as a necessity in rural life. No further advances have been received from the Treasury towards the deficit on the working of the scheme, as the advances to March 31st, 1936, amounted to £8,000, which was the limit imposed. The number of occupied premises in the area is 6,918, of which, at March 31st last, 5,391 were connected to the supply mains, or 78 per cent. Of the number of domestic premises and farms connected 38 per cent. were supplied with electric cookers. The total kWh sold was 15.1 million, an increase of 3.6 million (31 per cent.). Domestic and lighting supplies increased by 683,559 kWh, farm supplies by 83,452 kWh, and supplies to industrial consumers by 2,826,824 kWh. The number of kWh per consumer for lighting and domestic supplies increased from 800 to 849, and for farms from 1,565 to 1,896. The total kWh sold per head of population, excluding industrial supplies, was 215, but including industrial supplies it was 687. Supplies to industrial consumers (chiefly brickworks) constituted 68 per cent. of the total number of kWh sold, as compared with 43 per cent. in the first year of the operation of the scheme, from which it might appear that the demonstration area is emerging from a rural to an industrial type, but the brickworks are situated in only a small portion of the area, which, as a whole, remains typically rural. Capital expenditure during the year amounted to £19,821, a decrease of £7,867, and the total capital expenditure to March 31st was £283,298. The average income per consumer for lighting and domestic supplies increased from £4.63 to £4.74 and for farms from £8.81 to £9.86. A slight reduction is shown in the average price obtained per kWh for all classes of supply *viz.*, 0.783d. per kWh as against 0.835d., due to increased consumption.

Belgium.—Electric Power Production.—According to a report recently issued by the Union des Exploitations Electriques en Belgique the output of electric power in Belgium during 1936 amounted to 2,522 million kWh, as compared with 2,278 million kWh during the preceding year.

Blackpool.—Concession for Marton Area.—The additional charge of 10 per cent. for electricity supplied to the Marton area is to be discontinued. Originally the extra charge was 20 per cent. to meet the cost of laying mains such a long distance. The concession will cost the Department £1,500 per year.

Burton-on-Trent.—Mains and Services.—Sanction is being sought by the Electricity Committee to borrow £25,000 for mains and services.

Cannock.—Placing Mains Underground.—The Council proposes to substitute underground mains for the overhead lines from the Five Ways Inn to the top of Hill Street, Heath Hayes, at an estimated cost of £2,506.

Chesterfield.—Extensions.—The extension of the supply to Upper Newbold at a cost of £3,357 and to Hady Hill (£2,123) is to be carried out by the Electricity Committee.

Colchester.—Loans.—Application is to be made by the Town Council for sanction to the borrowing of £63,000 for unspecified works as follows: Mains and services, £24,000; domestic apparatus, £33,000; wiring installations, £1,000; meters, £5,000.

Dartford.—Mains.—The Electricity Committee is to extend mains at a cost of £493 to supply 176 houses being erected by Mr. P. C. Brazier at Burnham Road.

Douglas (I. o. M.).—Cable-laying.—The Electricity Committee is to lay a cable from the North Quay power station to Howard Street at an estimated cost of £860.

Dumfries.—Reduction.—The Electricity Department has announced that from the commencement of the next quarter the lighting tariff (quarterly meters), will be reduced to:—First 1,500 kWh per quarter, 4½d. per kWh; above 1,500 kWh per quarter, 4d. per kWh.

Dundee.—A Cooker Problem.—If the tenant of a Corporation house desires to replace a gas cooker with an electric model it has to be ascertained who will bear the cost of removing and storing the old cooker, the Gas or Electricity Department. The Town Clerk advises that approval of a change of cooker should be withheld unless the tenant pays to the Housing Department the cost of disconnecting the existing cooker, storing it, and putting it back in the event of the tenant moving. A decision in the matter has not yet been reached.

East Ham.—All-in Tariff Concession.—It is proposed to alter the "all-in" domestic tariff of 1d. per kWh so that after consumption reaches 600 kWh per quarter the price falls to ½d.

Gravesend.—Publicity Film.—Consideration has been given by the Electricity Committee to a letter from Advertising Films, Ltd., suggesting that the electricity undertaking should subscribe towards the making of a film for publicity purposes and offering in consideration of the payment of £15 per quarter, or a total of £60, to take a scene as desired and to exhibit the film fortnightly over a period of a year at the Majestic Cinema. The Committee decided in favour of the offer being accepted.

Swimming Pool Heating.—The water in the new swimming pool is to be electrically heated, subject to the Electricity Committee agreeing to supply energy at ½d. per kWh. A 300 kW electrode water boiler will be installed.

Prepayment Charges.—The electrical engineer has reported to the Electricity Committee that the principal reasons which necessitate charging more for supplies through prepayment meters are:—(*a*) During the year ended March 31st 328 meters were purchased at a cost of £1,300, whereas if the quarterly type had been installed instead the cost would have been £345. (*b*) The maintenance of a prepayment meter is considerably higher, probably three or four times that of the quarterly meter. The Committee has accepted the electrical engineer's report, and having regard to the initial cost and cost of maintenance of prepayment meters it recommends that no rebate shall be allowed to prepayment consumers.

Great Yarmouth.—Meter Testing.—The Town Council has authorised the electrical engineer to obtain, at a cost of £1,431, apparatus for the examination, testing and regulating of electricity meters, the cost to be defrayed out of revenue.

Haslingden.—Lower Charges.—The scale of electricity charges which came into force on April 1st, 1936, has been superseded by a new scale operative from October 1st, and recently approved by the Council. Under this the lighting flat rate is reduced from 4½d. to 4d. per kWh up to 100 kWh per quarter, and from 4d. to 3½d. for the next 400 kWh, the 3½d. and 3d. stages remaining as before. For heating and cooking the 1d. rate is discontinued, all consumption up to 500 kWh per quarter now being charged at ¾d. per kWh, and thereafter at 0.6d. The rateable value tariff running charge is now ½d. (hitherto ¾d. up to 160 kWh per quarter). For small power where the consumption does not exceed 150 kWh per quarter the rate is 1¾d. (against 2d.) and above this amount the scale has been altered from 1¾d./0.9d. to 1½d./0.85d. There is a discount of 5 per cent. for prompt payment.

Hove.—Supply Extension.—The Electricity Committee is to provide a supply to a block of fifty-six flats, known as Rutland Court, in New Church Road, at a cost of £720.

Hythe.—Street Lighting.—The Folkestone Electricity Supply Co. is to be asked to quote for a lighting scheme.

Japan.—Government Insists on Reduced Charges.—Under the Electric Enterprise Law electricity charges are to be revised on December 1st next. Proposals were submitted to the Government by the supply companies last June, but were rejected as representing too small a reduction. The Government requires that the reduction shall aggregate at least 30,000,000 yen per year, while that suggested by the companies is only 15,000,000 yen. Actually, in recent times electricity charges have fallen while other commodity prices have advanced. The price of coal is increasing, the present price being 50 per cent. higher than a year ago. The cost of maintaining plant and machinery has also advanced 30 per cent., and taxes are up 50 to 60 per cent. The Communications Department has increased the postal rate, although it is demanding a reduction in the charges for electricity. It is hoped that

the Government will consider the conditions, under all these circumstances, of the supply companies, and will not unreasonably insist upon its former policy.

Kettering.—SODIUM STREET LIGHTING.—For some months a street has been illuminated experimentally with sodium lamps, but they are to be removed as a result of criticism by pedestrians. The Electricity Department has no intention at present of using these lamps on a large scale, but they will in all probability be tried on main roads on the outskirts of the town, as it is felt that they are more suitable for lighting arterial roads.

Lincoln.—NEW EQUIPMENT.—Application is to be made to the Electricity Commissioners for sanction to borrow £15,000 for the purchase of electricity meters, and a further £5,000 for the provision of switchgear and transformers for use at sub-stations.

Lochgelly (Fife).—PAYMENT FOR COUNCIL HOUSE INSTALLATIONS.—The claim by tenants of Council houses for compensation for installing electric lighting was again discussed at a recent meeting of the local authority. It was stated that the auditor indicated that the payment of compensation would not be in order.

London.—FULHAM.—The Electricity and Lighting Committee is in agreement with the proposals of the Committee of Smaller Municipal Electricity Supply Undertakings for the reorganisation of electricity distribution. It proposes to inform the Prime Minister, the Minister of Transport, the Electricity Commissioners, and the local Members of Parliament accordingly.

ISLINGTON.—The Electricity Committee is to acquire a site in Green Lanes for the erection of a sub-station.

Middlesbrough.—TWO-PART TARIFF.—On the recommendation of the Electricity Committee the Town Council has agreed to introduce a two-part tariff for business premises from January 1st next. It will comprise a fixed charge of £3 10s. per kW of maximum demand for each of the two winter quarters and £2 for the summer quarters, subject to a minimum of 0.5 kW in any quarter; ½d. per kWh for all electricity used; and a rental of 2s. 6d. a quarter for the maximum demand indicator. There will be a discount of 10 per cent. for prompt payment of accounts.

MAINS.—Application is to be made by the Town Council for sanction to borrow £26,750 in connection with electricity mains extensions.

North Wales.—NEW PIPE-LINE.—The North Wales Power Co.'s new pipe-line from Lake Cowlyd to a hill-top 900 ft. above Dolgarrog was inaugurated last week. The scheme has involved the laying of 6 ft. steel pipes for a distance of nearly 2½ miles in the higher levels of the Conway Valley. The new waterworks give the company a 1,200 ft. head of water to the turbines at Dolgarrog instead of the 1,000 to 800 ft. available previously.

Northern Ireland.—GENERATION OF ELECTRICITY.—The Ministry of Commerce announces that 46.7 million kWh was generated by authorised undertakings in Northern Ireland during the quarter ended September 30th as compared with 40.9 million kWh in the corresponding quarter in 1936, representing an increase of 5.8 million kWh, or 14 per cent. The total number of kWh generated during the first nine months of 1937 was 161.1 million, compared with 142.4 million kWh for the corresponding period of 1936, an increase of 18.7 million kWh, or 13 per cent.

Portsoy.—LIGHTING SCHEME.—The Council has accepted the tender of Edmondsons Electricity Corporation, Ltd., for a complete electric street-lighting installation for the town and harbour.

Purley.—SUB-STATION.—The County of London Electric Supply Co., Ltd., is to erect a sub-station in Derwent Drive.

Rothes.—LIGHTING SCHEME.—An electric lighting scheme, estimated to cost £645, has been discussed at a special meeting of the Town Council, and Mr. Robertson (G.E.C.) has been asked to prepare a plan for submission to the County Council.

Rushden.—OVERHEAD LINE.—An application by the Rushden and District Electric Supply Co., Ltd., for consent to a temporary overhead line being erected across Hall Avenue has been rejected by the Urban District Council.

Seaham.—ELECTRIC LIGHTING.—The Urban District Council is to install electric lighting in twenty-five houses in Henry Street, thirty-six in Dawdon Crescent, and eight in Malvern Crescent.

Strathkinnes (Fife).—STREET LIGHTING.—A system of electric street lighting was inaugurated on October 14th.

Municipal Supply Undertakings' Results

Town.	Engineer.	Total Revenue.		Working Expenses.		Net Profit.		Sales of Electricity.		
								Thousands of kWh.		Percentage Increase.
		1935/36.	1936/37.	1935/36.	1936/37.	1935/36.	1936/37.	1935/36.	1936/37.	
		£	£	£	£	£	£			
Aberdeen	A. Gardner	235,597	256,182	122,511	137,527	14,789	17,320	54,742	62,363	13.9
Barrow-in-Furness	H. R. Burnett	121,600	134,408	74,062	84,968	8,220	9,252	28,062	31,112	10.8
Bedford	R. W. L. Phillips	198,409	227,375	143,214	155,129	5,923†	9,219	49,799	58,525	17.5
Belfast	F. H. Whysall	561,865	631,810	266,325	307,101	79,500	63,545	144,685	162,206	12.1
Bexhill	C. A. Frost	56,280	63,789	42,139	43,011	74†	4,144	7,135	8,334	16.8
Bingley	O. G. Cook	34,575	36,304	22,720	23,772	4,081	6,221	4,616	5,363	16.1
Birkenhead	F. E. Spencer	293,164	379,396	207,123	277,698	5,560	12,135	53,786	93,520*	73.8
Bradford	T. Roles	697,618	716,061	547,604	536,228	16,290	17,329	139,547	151,241	8.3
Bridlington	A. J. Beckett	39,999	42,042	20,808	23,851	9,035	7,067	3,428	4,006	16.8
Brighton	W. N. C. Clinch	472,625	527,213	327,357	382,610	27,789	21,796	107,469	124,004	15.3
Bristol	A. J. Newman	946,840	1,059,898	582,103	650,330	107,732	114,220	203,684	240,509	18.1
Burnley	J. E. Starkie	114,563	117,369	76,903	83,722	14,246	5,102	17,486	20,414	16.7
Bury	J. G. Potts	128,472	144,790	106,172	116,251	5,708	11,248	30,830	35,985	16.7
Cannock	P. Warder	55,037	65,419	36,241	41,222	2,765	6,365	8,423	10,085	19.7
Clitheroe	A. H. Todd	24,358	31,605	14,388	20,357	2,191	2,583	3,135	6,988‖	122.9
Congleton	R. Bell	14,459	17,175	7,697	10,268	2,004	1,530	1,780	2,644	48.5
Darwen	F. M. Fletcher	41,365	44,927	26,311	27,896	4,473	6,134	6,447	7,023	8.9
Derby	F. Nicholls	317,418	355,916	201,555	231,977	22,125	26,864	66,885	78,273	17.0
Douglas	B. Kelly	66,409	72,497	35,234	42,371	6,214	3,138	6,475	8,063	25.5
Eastbourne	J. K. Brydges	221,818	236,032	179,363	189,837	625†	4,755†	33,994	36,192	6.4
Edinburgh	E. Seddon	919,539	1,011,035	697,775	831,478	30,752	34,661	190,236	207,632	9.1
Erith	E. A. Logan	76,497	81,474	54,433	59,448	15,100	13,503	21,452	24,383	13.6
Fleetwood	W. P. Lilwall	55,389	60,822	38,480	42,586	4,356	5,028	12,791	14,189	10.9
Gillingham	H. Hall	92,374	97,419	71,465	76,663	2,548	2,032	19,033	21,022	10.4
Glasgow	H. Bell	1,235,332	1,378,500	718,417	795,354	57,805	145,375	357,692	413,372	15.5
Great Yarmouth	P. E. Rycroft	163,498	169,499	88,274	99,049	29,451	15,054	29,199	33,686	15.3
Guildford	W. E. Affleck	109,462	121,289	50,073	67,039	6,535	10,885	20,248	25,542	26.1
Hackney	E. A. Mills	375,672	398,301	232,437	278,922	25,459	15,242	62,750	71,529	13.9
Halifax	G. A. Vowles	214,652	231,354	147,662	149,114	25,126	42,083	49,673	55,693	12.1
Hazel Grove and Bramhall	A. D. Pluck	38,388	36,241	26,482	24,773	2,457	1,337	3,385	3,968	17.2
Hornsey	F. C. Orchard	114,049	121,135	76,708	85,446	2,918	1,226†	13,578	14,854	9.4
Hull	J. N. Waite	672,955	769,930	483,375	553,569	41,704	59,947	173,994	196,642	13.0
Islington	A. P. MacAlister	327,835	325,216	215,389	244,274	51,483	16,533	49,497	51,953	4.9
Kettering	W. A. Walker	197,287	249,897	139,767	195,242	12,007	3,929	67,122§	91,145§	35.7
Leicester	J. Mould	637,307	716,498	398,780	454,896	56,458	66,308	119,590	136,172	13.8
Leigh	J. B. Hudson	69,471	76,058	46,097	53,128	9,759	8,874	14,916	16,890	13.2
Liverpool	P. J. Robinson	1,796,788	1,964,831	1,089,559	1,220,424	99,395	99,379	389,104	435,294	11.8
Mexborough	E. Andrews	28,577	30,529	19,551	20,485	2,264	3,053	3,388	3,563	5.1
Newport	A. Nichols Moore	238,266	258,652	172,208	177,493	1,901†	2,873	50,481	54,928	8.8
Newton-in-Makerfield	W. Phoenix	30,002	32,148	22,123	23,514	1,884	1,530	5,931	5,789	−2.4
Norwich	V. A. Pask	422,816	481,181	277,804	320,312	38,900	42,706	63,594	74,188	16.6
Nottingham	G. H. Lake	725,347	775,611	425,744	437,153	63,052	82,282	120,386	128,637	6.8
Oldham	F. L. Ogden	315,500	332,247	198,042	219,462	26,375	31,661	68,215	73,210	7.3
Preston	D. Adams	473,399	506,668	336,865	362,206	9,280	3,345	150,395	165,107	9.7
St. Helens	W. S. Johnston	194,507	220,491	132,701	146,155	31,718	42,139	57,939	66,166	14.1
St. Marylebone	C. H. Smyth	698,663	762,768	491,858	557,900	9,866	14,777	173,160	189,791	9.6
Sheffield	J. R. Struthers	1,259,859	1,407,952	710,222	792,374	117,795	195,325	404,313	476,961	17.9
Southampton	W. G. Turner	351,996	397,205	237,832	256,205	4,994†	10,462	69,421	78,301	12.7
Southend	A. C. Johnson	326,888	343,893	188,346	224,442	72,268	8,736	49,553	59,104	19.2
South Shields	N. T. Smith	124,956	133,617	69,940	79,285	265	389	14,007	16,204	15.7
Stockton-on-Tees	S. G. Marston	81,164	90,285	50,708	57,083	12,002	16,114	11,952	13,607	13.8
Stoke-on-Trent	C. H. Yeaman	323,558	383,607	206,443	248,192	34,599	41,217	79,128	92,852	17.3
Sutton Coldfield	T. Bloore	63,260	69,789	35,558	40,331	6,376	6,155	8,597	10,595	23.2
Tunbridge Wells	R. N. Torpy	141,733	147,301	82,967	92,190	22,387	16,075	30,340	33,888	11.7
Wallasey	B. T. Hawkins	213,446	213,022	141,437	146,804	18,483	14,992	30,242	32,997	9.11
Watford	A. W. Barham	203,559	229,474	119,495	135,291	23,394	27,812	55,219	59,335	7.4
West Ham	J. W. J. Townley	594,089	643,885	378,398	414,567	48,735	60,254	130,917	143,279	9.4
Whitworth	J. Ratcliffe	14,357	16,602	10,710	11,817	407	612	2,642	3,048	15.3
Willesden	J. D. Spark	322,563	348,601	245,633	270,153	23,183	23,186	66,958	73,881	10 3
Winchester	R. Ayton	60,588	60,035	37,993	38,812	4,821	1,222	3,928	4,243	8.0
Worksop	M. S. Mason	49,347	54,146	36,566	36,703	4,760	5,824	7,833	9,154	16.9

* Includes bulk supply to Messrs. Lever Bros., Ltd. † Net loss.
§ Includes bulk supply to Corby Steelworks. ‖ Includes bulk supply to Ribblesdale Cement, Ltd.

Taunton.—LOWER CHARGES.—The following revised scale of charges has been adopted by the Town Council. It takes effect as from the reading of the meters for the Michaelmas quarter: Lighting, 4d. per kWh for all electricity consumed up to 200 kWh per quarter (a decrease of ¼d. per kWh); 3½d. per kWh from 201 to 400 kWh; 2½d. per kWh from 401 to 3,000 kWh; and 2d. per kWh for any number in excess. Power, 1½d. for the first 2,000 kWh per quarter; 1d. from 2,001 to 8,000 kWh per quarter; and ¾d. per kWh for consumption in excess of 8,000 kWh per quarter (under the old scale the charge per kWh was 1¼d. when consumption did not exceed 4,000 kWh per quarter). Two-part tariff for domestic premises, 9 per cent. per annum of the gross value up to £50, and 5 per cent. per annum in excess of £50, plus ¼d. per kWh (old rate, ½d. per kWh). The charges to consumers in the outside area have been reduced from 25 to 20 per cent. over the borough rates.

Demonstration of electrical appliances for poultry and dairy farms at the Charing Cross Underground Station
(see page 572) [*Elec. Rev. photos.*

Traction

Darwen.—TRAM SERVICE DISCONTINUED.—Buses have been introduced in place of the trams on the route from Darwen to Hoddlesden.

Italy.—FRONTIER ELECTRIFICATION.—3,000-V d.c. electric traction is to be inaugurated on October 28th on the Trieste to Opicina railway line, which forms the first section of the route from Trieste over the Austrian and Jugoslav frontiers.

Switzerland.—HIGH-SPEED TRAINS.—The two streamlined three-car electric trains for express traffic over the 15-kV, single-phase lines of the Swiss Federal Railways are now in service. The electrical equipment was made by Oerlikon and Secheron, and the six traction motors have an aggregate output at the one-hour rate of 2,350 h.p. at 70 m.p.h., the top speed being 93 m.p.h. There are seats for 192 passengers and the tare weight is 115 tons.

ELECTRIC RACK RAILWAY.—Since the beginning of this month traffic over the Vitznau-Rigi rack railway, near Lake Lucerne, has been worked electrically by small motor coaches. The conversion of this line to electric traction has taken sixteen months.

United States.—DIESEL-ELECTRIC TRACTION.—The Chicago, Rock Island and Pacific Railroad has put into service six 1,200-b.h.p. Diesel-electric locomotives hauling stainless-steel trains on long-distance business services in the Chicago, Twin Cities, and Kansas City area. Each locomotive has four G.E. traction motors giving a starting tractive effort of 55,000 lb. and enabling a speed of 100 m.p.h. to be reached.

Communications

Egypt.—RADIO RECEIVERS FOR FARMERS.—A *Reuter* message from Alexandria states that 2,000 radio sets will be installed free in various selected villages of the country if a scheme devised by Mr. S. G. Newport, Superintendent of Broadcasting at the Ministry of Communications, is carried out. It is believed that the plan has met with the approval of the Government and that it is ready to put the project into operation. The scheme is primarily to aid the many thousands of adults who are practically illiterate. Regular educational talks are planned which will be broadcast from the local studios.

Great Britain.—LAYING CABLES ACROSS LOCH AWE.—A novel method by which telephone cables were laid across Loch Awe is described by Messrs. W. Bocock, A.M.I.E.E., and G. H. Walton in the *Post Office Electrical Engineers' Journal*. Except for a shallow stream Loch Awe is entirely inland and a suitable boat for cable-laying was not available. The drawing of the cable across the bed of the loch was ruled out on account of the excessive strain which would be imposed, and the possibility of damage to the cables due to abrasion. Further, if left unsupported for a distance on the bed of the loch with a tensional strain, a risk of vibrational damage to the cable sheath would be incurred. To build a raft sufficiently large to transport cables, men and gear would have resulted in abnormal expense, and difficulty was anticipated in unloading the cable drum from the raft owing to the long shelving beach at Taycreggan. In these circumstances, the contractors (United Telephone Cables, Ltd.) suggested a scheme of drawing over the cables on the surface of the loch using 6-gal. drums as floats attached to the cables, and puncturing the drums at a later stage to sink the cables. This method was approved by the engineer-in-chief. To determine the number of drums necessary to float and later sink the cable at a suitable speed, the contractors carried out a series of experiments using a large tank at their works, following which a number of tests were made on Loch Awe. An essential feature of the scheme was that all the floats should be punctured before submerging. The submarine cable weighs 7.8 lb. per ft. and it was demonstrated that with a $\frac{1}{16}$-in. diameter hole on the bottom and a $\frac{3}{32}$-in. hole at the top of the drums the cable would be floated for a period of approximately 27 min. before submerging. In all 800 drums were used. The bottom holes were made before the drums were tied to the cable. The puncturing of the tops of the drums was accomplished in 21 min. by men in four rowing boats, using specially shaped hammers.

United States.—TELEVISION.—A *Reuter* message from New York states that tentative plans for a non-commercial programme of television broadcasts to begin in the near future have been announced by the president of the Columbia Broadcasting System of America, Mr. W. S. Paley. Television broadcasts, beginning with important news and sports events, are to be made from the top of the Chrysler Building..

Condenser Water Troubles at Fulham

SOME trouble has been experienced with the screens at the condenser water intakes at the new power station due to leaves and other vegetable matter brought down after heavy rains and also from small pieces of water-logged timber. Two sets of screens have been provided, namely, external bar screens to keep out large solid substances, and internal moving screens which are self-cleansing. The external screens allow small objects such as leaves, to pass through, to be dealt with by the moving screens, but at times the quantity of leaves, pieces of branches or water-logged timber, are sufficient partially to choke the bar screens or to hamper seriously the operation of the moving screens, and the obstruction, therefore, becomes a danger to the working of the station. The consulting engineers have advised that the only remedy for these obstructions is to construct an additional screen, outside the present screens, far enough into the river to be within the tidal influence at any time, and large enough to reduce the velocity of the water passing through the screen. First, however, a survey is to be carried out by Peter Lind & Co., Ltd., to provide the required data concerning the tidal flow of the river. The borough electrical engineer has reported that mud from the river is active in the circulating water at the power station, and that this results in the fouling of the condenser tubes. One of the methods of counteracting this fouling is to introduce chlorine into the circulating water, and the engineer has, therefore, arranged to hire a chlorination plant for the No. 2 turbo-alternator, for experimental purposes.

Contract Information

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses

Contracts Open

Aldershot.—November 2nd. Borough Council. Automatic telephones at the Isolation Hospital, Cemetery Road. (October 8th.)

Audenshaw.—November 4th. U.D.C. Electrical installations at twenty-four houses to be erected on the Wellington Street estate. J. Eaton & Sons, architects, Stamford Street, Ashton-under-Lyne.

Basford (NOTTINGHAM).—October 26th. R.D.C. Two pumping units (each capable of raising 350 gal. of sewage per min.), including electric motors and switchgear, at Jacksdale pumping station, and one unit (115 gal. per min.), including electric motor and switchgear, at Bagthorpe sewage disposal works. J. J. Ellis, engineer, Rock House, Stockhill Lane.

Bradford.—October 29th. Passenger Transport Committee. Supplies for twelve months, including electrical fittings for vehicles, strand wire and copper controller contacts and electrodes. C. R. Tattam, general manager, 11, Forster Square.

Breconshire.—October 28th. County Council. Electric lighting at senior schools. H. C. W. Strickland, county architect, Watton Offices, Brecon.

Brighton.—October 25th. Corporation. Two 1,500-kVA outdoor type transformers for the Southwick power station. (October 15th.)

Carlisle.—Cumberland, Westmorland and Carlisle Joint Committee for the Mentally Defective. Steam boiler, electric generator, steam and condenser mains, &c., at the Dovenby Hall Mental Defective Colony, near Cockermouth. Applications to S. B. Harston, clerk to the Committee, 18, Bank Street, by October 24th.

Dalkeith.—October 25th. Town Council. Electrical work at the Buccleuch Street estate. Morham and Brotchie, surveyors, 29, Hanover Street, Edinburgh.

Dewsbury.—October 26th. Borough Council. L.v. cables for one year. (See this issue.)

Dumfries.—October 28th. Burgh Council. Two 200-kVA transformers and one 3-panel h.v. metal-clad switchboard. (October 15th.)

East Lothian.—County Council (Western and Eastern Districts). Various works, including electric lighting, at housing estates. Applications to the county architect, County Buildings, Haddington, by October 25th.

Edinburgh.—November 18th. Burgh Council. Coal handling plant for the Portobello generating station. (See this issue.)

Exeter.—November 10th. City Council. Overhead cable (1,075 yd. in length) from Countess Wear swing bridge to Double Locks, or, alternatively, the supply and erection of electrical plant at Double Locks Hotel. R. H. Dymond, city engineer, Municipal Offices.

Finchley.—October 25th. Borough Council. E.h.v. and l.v. cables. (October 8th.)

Gellygaer.—November 1st. Electricity Department. House service meters. (October 15th.)

Gloucestershire.—Education Committee. Electric lighting installations at Filton Junior Mixed school and Longlevens Junior Mixed school. R. S. Phillips, county architect, Shire Hall, Gloucester (deposit £2 2s. in each case).

Gosport.—October 26th. Borough Council. Electric lighting at 175 houses on the Forton estate, 133 houses on the Ann's Hill estate, and forty-two houses on the Seafield estate. (October 15th.)

Halifax.—November 11th. Corporation. Six electrically driven centrifugal pumps for the sewage works, Copley and North Dean (Con. L.4). C. Lumb, manager, Sewage Department, Salterhebble.

Heston and Isleworth.—October 30th. Borough Council. Electric lighting and power installation at the proposed public swimming bath, New Heston Road, Heston. (See this issue.)

Hornsey.—October 30th. Electricity Department. D.c. and a.c. meters and fixed charge collectors, maximum demand indicators, load controllers and time switches. (October 15th.)

India.—NEW DELHI.—November 9th. Stores Department (Electrical Branch). 25-kW and 10-kW oil engine driven portable generating sets, battery charging equipment, switchboard, spares, &c. (T. 20153/37.)*

Iran.—Ministry of Posts, Telegraphs and Telephones. Short and medium wave radio receiving apparatus. (October 15th.)

Irish Free State.—DUBLIN.—November 20th. Electricity Supply Board. 40-kV and 10-kV underground power cables, with pilot and telephone cables and jointing accessories; also cable laying. (October 15th.)

KILLARNEY.—October 26th. Committee of Management of Killarney Mental Hospital. Electrically operated laundry equipment at the Hospital, and removal and disposal of old plant. N. O'Dwyer, consulting engineer, Veritas House, Lower Abbey Street, Dublin (deposit £5 5s.).

Lancashire.—November 9th. County Council. Electric lighting at the new senior, junior and infants' school, Huyton, near Liverpool. Particulars from S. Wilkinson, county architect, County Offices, Preston (deposit £2), by October 23rd.

Manchester.—November 3rd. Electricity Committee. H.p. steam and water valves and traps at the Stuart Street station, and coal-handling plants, each comprising conveyor, drag scrapers and steam jib cranes, at the Barton and Stuart Street stations. (See this issue.)

Middlesex.—November 22nd. County Council. Electrical installation at the new Technical Institute, The Burroughs, Hendon. (See this issue.)

New Zealand.—WELLINGTON.—December 1st. Stores Control Board. Two steam engine- or turbine-driven alternators, switchgear, electric motors and one motor-driven centrifugal pump. (T.Y. 20412/37.)*

Rothesay.—October 25th. Electricity Department. 6,600-V metal-clad switchboard, e.h.v. outdoor switchgear and twelve months' supply of transformers and cables. (October 8th.)

Sheffield.—November 1st. Electricity Committee. Reinforced concrete and other works for the accommodation of a 50,000-kW turbo-alternator and boiler in the No. 2 station at Blackburn Meadows. (October 15th.)

Shipston-on-Stour.—October 30th. R.D.C. Electric lighting at thirty Council houses at Tysoe and six at Little Compton. E. H. Earp, 48, Henley Street, Stratford-on-Avon.

Skipton.—November 4th. R.D.C. Pumping station, with electric motor and borehole pump, and all contingent works. F. J. Rodwell & Son, engineers, 20, Park Row, Leeds (deposit £2 2s.).

South Africa.—CAPE TOWN.—November 24th. Electricity Department. Electric lighting poles, c.i. pole bases and overhead line material. (T.Y. 20633/37.)*

JOHANNESBURG.—November 13th. City Council. H. and l.v. cable. (T.Y. 20665/37.)* 123 oil-immersed indoor-type transformers. (T. 20666/37.)*

South Cambridgeshire.—November 2nd. R.D.C. Duplicate electrically driven vertical centrifugal borehole pumps, of 15,000 gal. per hr. capacity, with recording equipment and accessories for the pump-house, near Wendy, in connection with the Western area water scheme. Sands & Walker, Milton Chambers, Nottingham (deposit £3 3s.).

Southend-on-Sea.—December 8th. Borough Council. 250-kVA alternator, motors, switchgear and accessories, at the refuse disposal works. (See this issue.)

South Kesteven.—October 30th. R.D.C. Electrically driven horizontal type centrifugal pump (60-gal. per min.). C. W. Bell, clerk, 41, North Street, Bourne, Lincs.

Stoke-on-Trent.—November 10th. Electrical Engineer's Department. Electric tower wagon. (October 15th.) Two 15,000-kVA outdoor-type transformers. (See this issue.)

Uruguay.—MONTEVIDEO.—November 12th. State Electricity Supply and Telephones Administration. Electricity meters. (T.Y. 20084/37.)*

December 3rd. 131,400 metres of single-, two- and three-core l.c. conductors. (T.Y. 20716/37.)*

December 7th. Three automatic voltage regulators and accessories. (T.Y. 20717/37.)*

West Hartlepool.—October 23rd. Borough Council. Fire extinguishing equipment at the Tower Street sub-station (automatic operation in addition to manual control). (October 15th.)

West Riding.—October 25th. County Council. Electric lighting in Rawdon Littlemoor Council school. C. Anderson, divisional clerk, West Riding Education Office, Otley.

Zetland.—November 11th. County Council. Electrical work at forty houses. H. K. Macdonald, county architect, 30, Commercial Street, Lerwick.

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* Further particulars from the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, London, S.W.1.

Contracts Closed

Aberystwyth.—Electricity Committee. Accepted. Generating plant (£23,777).—English Electric Co.

Bedford.—Electricity Committee. Recommended. 2,000-V transformer kiosk (£438).—Crompton, Parkinson. Transformers for a further twelve months.—British Electric Transformer Co. Inter-connecting switchgear (£5,019).—B.T.H.

Birmingham.—Education Committee. Accepted. Electric lighting installation at the new Council school, Turves Green, Northfield (£975).—Stuart Electrical Co.

Bolton.—Education Committee. Accepted. Main electric services at new Technical College.—Engineering Service Co. Electric lifts.—Pickerings, Ltd.

Cannock.—U.D.C. Accepted. Electric lighting installation at the new Littleworth school (£1,171).—Birch & Evans.

Darlington.—Town Council. Accepted. Feeder switchgear reactor, in connection with the extensions to the electricity undertaking.—A. Reyrolle & Co.

Glasgow.—Electricity Committee. Accepted. Neon sign at the Electricity Department, Waterloo Street (£596).—Boro' Electric Signs.

Gas Committee. Accepted. Installation of departmental telephone system (£382).—Dictograph Telephones, Ltd.

Transport Committee. Accepted. Copper trolley wire.—W. F. Dennis & Co. (representing Felten & Guilleaume, Germany). L.c. cable.—Standard Telephones (£4,582); Craigpark Electric Cable Co. (£4,166).

Accepted. Tramway street poles.—Stewarts & Lloyds, Ltd. Tramway rail carrier and trailer.—Ritchie's, Ltd. Voltage regulator for Pinkston power station.—B.T.H.

Kilmarnock.—Accepted. Electric lighting at the new Maternity Home.—J. C. Baillie.

Lanarkshire.—County Council. Accepted. Electrical installations at fifty-two houses at Lesmahagow.—D. Henderson.

London.—ISLINGTON.—Electricity Committee. Recommended. Sixty light steel lamp columns (£11 1s. 6d. each).—Newport and South Wales Tube Co. Twenty-four heavy steel columns (£20 18s. each).—Stewarts & Lloyds. Lanterns (£5 15s. 10d. each).—Revo Electric Co. Fifty-seven sets of automatic lighting control equipment (£4 15s. 3d. per set).—Radiovisor Parent, Ltd. Seventy-three sets of raising and lowering gear (£4 5s. per set).—Engineering & Lighting Equipment Co.

FULHAM.—Electricity and Lighting Committee. Two 200-kVA transformers at the Imperial Road sub-station (£176 each).—British Electric Transformer Co. Two l.v. switchboards at the Imperial Road sub-station and two at the Bagley's Lane sub-station (£18 10s. per transformer panel, and £12 6s. per distributor panel).—W. Lucy & Co.

L.C.C.—Wiring and fittings for electric lighting, &c., in blocks 1 to 5 of dwellings on the Tabard Garden estate (Law Street area), Southwark:

	£		£
Holliday & Son (Electrical) Accepted	**1,627**	H. J. Cash & Co.	1,792
Coleby & Co.	1,689	Pemberton and Sturgess (Great Britain)	1,797
Carr Bros.	1,726	Atozed (Kingston)	1,873
Electrical Installations, Ltd. ...	1,789	Pinching and Walton	1,896

Wiring and fittings for electric lighting, &c., in the first portion of block 1 of dwellings on the Lant Street area, Southwark:

	£		£
Henfrey Electrical Installations. Accepted	**425**	City Electrical Co.	463
A. Hawkins & Sons	425	G. E. Taylor & Co.	481
Coleby & Co.	448	Springvale Electrical Co. ...	739
Read and Partners	452	Jones and Jennings	815

Lowestoft.—Electricity Committee. Recommended. Fire prevention apparatus at ten sub-stations (£636).—Walter Kidde & Co.

Portsmouth.—Education Committee. Accepted. Electrical installation at the new Training College (£1,245).—Shields & Marshall.

Swansea.—Electricity Committee. Accepted. Four feeder panels (£129 each).—W. Lucy & Co.

Warrington.—Electricity Committee. Accepted. Cables for twelve months.—B.I. Cables.

Housing Committee. Accepted. Wiring 174 Council houses.—Warrington Electrical Co.

Forthcoming Events

Institution of Electrical Engineers.—Monday, October 25th. Institution, London, W.C.2. 7 p.m. Informal meeting. Discussion on "Control of Costs in an Operating Organisation." To be opened by Sir George Lee.

North Eastern Centre.—Monday, October 25th. The Newe House (News Theatre), Newcastle-on-Tyne. 6.15 p.m. Chairman's address by Mr. W. D. Horsley.

Western Centre.—Monday, October 25th. Monmouth. Informal discussion on "Rural Matters." To be opened by Mr. C. T. Allan.

East Midland Sub-Centre.—Tuesday, October 26th. University College, Nottingham. "Modern Factors Affecting Electricity Costs and Charges." Mr. J. A. Sumner.

Northern Ireland Sub-Centre.—Tuesday, October 26th. 9, Wellington Place, Belfast. 6.30 p.m. Chairman's address by Mr. F. H. Whysall.

North Midland Centre.—Tuesday, October 26th. Hotel Metropole, Leeds. 7 p.m. "The Use of Protective Multiple Earthing and Earth-Leakage Circuit Breakers in Rural Areas." Mr. H. G. Taylor.

Scottish Centre.—Tuesday, October 26th. North British Station Hotel, Edinburgh. 7 p.m. "Fire Precautions in Major Electrical Stations." Mr. F. C. Winfield.

Irish Centre.—Thursday, October 28th. Trinity College, Dublin, 6 p.m. Chairman's address by Lt.-Col. K. E. Edgeworth.

West Wales (Swansea) Sub-Centre.—Thursday, October 28th. Technical College, Swansea. 6.30 p.m. Chairman's address by Mr. E. F. Cope.

Mersey and North Wales (Liverpool) Centre.—Friday, October 29th. Reece's Red-White Ballroom, Liverpool. 8.30 p.m. Dinner-dance.

Institution of Railway Signal Engineers.—Friday, October 22nd. Criterion Restaurant, London, W.1. Annual dinner.

Physical Society.—Friday, October 22nd. Imperial College of Science and Technology, London, S.W.7. 5.15 p.m. Guthrie Lecture. "The Appraisement of Lighting." Dr. C. C. Paterson.

Association of Supervising Electrical Engineers.—Saturday, October 23rd. Hotel Russell, London, W.C.1. Dinner and dance. Wednesday, October 27th. Chamber of Commerce, New Street, Birmingham. 7.15 p.m. "Compulsory Wiring Regulations and Registration." Mr. A. Kirk. Saturday, October 30th. Central Library, Sheffield. 6 p.m. "Compulsory Wiring Regulations and Registration." Mr. J. Munro.

Electrical Power Engineers' Association *(Northern Division.).*—Saturday, October 23rd. Grosvenor Hotel, Manchester. 6.30 p.m. Supper-dance. Thursday, October 28th. Engineers' Club, Manchester. 7.15 p.m. "A Discussion on Tariffs from the Users' and Suppliers' Point of View." Messrs. O. Howarth and J. A. Somerset.

Birmingham Electric Club.—Monday, October 25th. Grand Hotel, Birmingham. 7 p.m. "The Development of Air Conditioning Load in the U.S.A." Mr. J. C. Chaytor.

Faraday House Old Students' Association.—Friday, October 29th. Savoy Hotel, London, W.C.2. 6.30 for 7 p.m. Annual dinner.

Junior Institution of Engineers.—Friday, October 29th. 39, Victoria Street, London, S.W.1. 7.30 p.m. Informal meeting. "Submarine Telegraph Cables." Mr. H. G. S. Trowbridge. Friday, October 29th. College of Technology, Manchester. 2.30 p.m. Joint technical discussion on materials and their testing.

Notes

The Treforest Trading Estate

A visit by the Duke of Kent on Wednesday marked the opening of the new 300-acre estate which the South Wales and Monmouthshire Trading Estate, Ltd., is establishing at Treforest in connection with the Government's scheme for attracting new industries to South Wales and other "distressed areas." Situated three miles from Pontypridd, three and a half miles from Caerphilly, and seven miles from Cardiff, the estate is very conveniently placed as regards transport, coal, electricity (several attractive alternative tariffs are offered), water and other services, while the fact that there are about 125,000 men and 110,000 women (many of them out of work) living in the immediate vicinity should obviate any labour difficulties. It is hoped that when Treforest is fully developed there will be employment for 5,000 men and women. The scheme aims at providing between fifty and seventy factories built to the manufacturers' individual requirements on the most up-to-date lines with the minimum trouble and expense. Already ten factories have been let and are in various stages of construction; negotiations have also been practically completed for letting six more. Several electrical manufacturers are taking advantage of the facilities offered and production will commence almost immediately at the first electrical works to be completed, that of Celtic Electrical Products, Ltd., where storage batteries will be produced. A 13,000-sq. ft. factory is planned by Whitehead's Switchgear Co., Ltd., for the manufacture of high- and low-voltage switchgear, and the Edison Swan Electric Co., Ltd., is to organise a distribution centre and store to serve the South Wales area. Other new works definitely to be established cover general engineering, and a variety of other industries. Three acres of the land have been reserved by the Ministry of Labour for the provision of a training centre for prospective employés on the estate; in addition to workshops and lecture rooms accommodating about 120 there will be a physical training hut, clinic, dining room, offices and stores. The main contractors for the civil engineering works are the Holborn Construction Co., Ltd., an associate of W. T. Henley's Telegraph Works Co., Ltd. The activities of the trading estate company are not limited to Treforest. Sites for other possible estates in South Wales have been noted and the clearance of old factory sites in other parts of the area has already been undertaken on behalf of the Commissioner for the Special Areas. Constructional work has, for example, been nearly completed at a 26,000-sq. ft. factory for Hall's Telephone Accessories, Ltd., on the site of the Old Dowlais Ironworks at Merthyr Tydfil.

E.A.W. Activities

The Electrical Association for Women has arranged home workers' classes at the Wimbledon Electricity Showrooms, Wimbledon Bridge, and a meeting was held on Wednesday at the Finchley Electricity Showroom to inaugurate similar classes in that district.

The Cardiff and District Branch proposes to form a teachers' and demonstrators' circle.

Next year's annual conference will be held in London at the Park Lane Hotel, Piccadilly, from April 27th to 29th.

Engineers and Passport Declarations

It has been decided that chartered engineers shall be authorised to sign the declarations of applicants for British passports. This will apply to chartered civil, electrical, mechanical, gas, structural and marine engineers.

Appointments Vacant

Assistant electrical engineer for the Federated Malay States Electricity Department.

Chief electrical assistant for Liverpool Electric Supply Department.

Teacher in electrical engineering at Norwich Technical College.

Charge engineer and publicity officer for Fulham Borough Council.

Meter tester and repairer and meter inspector and tester for Heston and Isleworth Electricity Department.

Sub-station charge engineer and three overhead linesmen for the North West Midlands J.E.A.

Foreman, Meter Department, for the London and Home Counties J.E.A.

Male showroom attendant and canvasser for East Grinstead U.D.C.

Mains assistant for Blackburn electricity undertaking.

Meter engineer for Kettering Electricity Department.

(See our Classified Advertisements.)

Our Service Department

EVERY day inquiries of all kinds are received by the Editors, the bulk of them relating to the producers of specified classes of electrical goods. We are able to reply to most of these with the aid of our extensive records, but in a few cases we have to seek the assistance of our readers. This week we have been asked for the names and addresses of manufacturers of the following:—

RAYSOL sun lamp.

Readers should enclose stamped addressed envelopes when making their inquiries.

Our Personal Column

Electrical men are invited to keep readers of the "Electrical Review" posted concerning their movements

Lt.-Col. Lord Dudley Gordon, D.S.O., chairman and managing director of J. and E. Hall, Ltd., has been re-elected president of the British Engineers' Association for the ensuing year.

Mr. E. Tatton, of the mains section Stockport Corporation Electricity Department, has been appointed assistant mains engineer at Islington.

A number of well-known electrical engineers, who are members of the Consultative Technical Committee of the South West England and South Wales Area of the Central Electricity Board, recently visited Bournemouth to attend a meeting of that committee. The accompanying illustration is reproduced from a photograph taken during the visit.

Left to right: Messrs. H. G. Fraser (Oxford), D. H. Kendon (Cornwall Electric Power Co.), W. G. Turner (Southampton); H. S. Ellis (West Gloucestershire Power Co.), J. T. H. Legge (C.E.B.), A. J. Newman (Bristol), A. Nichols Moore (Newport), H. Midgley (Plymouth), G. J. Hollyer (Torquay), L. Howles (South Wales Electric Power Co.), and E. Jones (Cardiff).

Mr. T. T. Partridge, M.I.E.E., M.I.Struct.E., first superintending engineer of the Northern Ireland District of the Post Office Engineering Department, retired at the end of last month, we learn from the *Post Office Electrical Engineers' Journal*. Mr. Partridge's efforts were largely responsible for the formation of the Northern Ireland Sub-Centre of the Institution of Electrical Engineers, of which he was the first chairman. He is succeeded by **Mr. H. S. Thompson,** M.I.E.E., superintending engineer, South Wales District, whose place is taken by **Col. H. Carter,** T.D., B.Sc., M.I.E.E., staff engineer in charge of the external plant and protection branch of the Engineer-in-Chief's Office, to which position **Mr. P. B. Frost,** B.Sc., M.I.E.E., has now been appointed.

Messrs. J. Fraser and **G. Washington,** members of the staff of the Bunnerong power station of the Sydney County Council, are arriving in this country about the middle of December to study recent developments in cable practice, street lighting, and meter maintenance. Communications for them should be addressed to 8, Queen Anne's Gate, Westminster, London, S.W.1.

Mr. M. A. Tidmarch, manager of the Wallsend power station, who has spent most of his working life with the North-Eastern Electric Supply Co., Ltd., has retired. He has received a gift from the employés and the company.

Mr. F. G. H. Macrae, chief engineer, Theatre Royal, Drury Lane, has recently been elected a fellow of the Royal Society of Arts.

Mr. D. P. C. Neave, who has been general manager and secretary of the Copper Development Association since its inception in 1933, is resigning at the end of the present year. **Mr. G. W. Preston,** the Association's electrical engineer, has been appointed general manager, and **Dr. S. Baker,** now assistant secretary, will become secretary.

Mr. W. C. Lempriere has retired from the board of J. & E. Hall, Ltd.

Mr. E. Lunn, whose appointment as borough electrical engineer at Huddersfield was recently confirmed by the Corporation, will succeed Mr. J. W. Turner, who is retiring on December 31st. Mr. Lunn served a mechanical engineering apprenticeship under Mr. J. Pogson, M.I.M.E., in the shops and drawing office of the Huddersfield Corporation steam tramways and later was an improver in the electrical department of R. Holliday & Sons on dynamo and switchboard construction work. Following this he joined the Huddersfield Corporation Electricity Department as junior assistant, later becoming station superintendent. For the past seventeen years he has been deputy borough electrical engineer. He has been an associate member of the I.E.E. since 1906, and is a member of the Institute of Fuel. In 1909 he was awarded the I.M.E.A. associates' £10 prize for a paper on condensing and water cooling plants.

Mr. E. Lunn

The Institution of Civil Engineers has announced its awards for papers contributed during 1936-37. These include the following:—A James Watt gold medal to **Sir Noel Ashbridge** for his paper on "Modern Developments in Broadcasting Transmission and Television." Telford premiums to **Mr. A. H. Naylor** for his paper on "The Second-Stage Development of the Lochaber Water-Power Scheme," and **Mr. S. F. Dorey,** "Welded Joints in Pressure-Vessels." A Trevithick premium has been awarded to **Prof. B. L. Goodlet** for a paper on "The Impedance of Transformers Connected in Cascade," **Mr. N. C. C. de Jong** receives a Miller prize for "Telephone Cables," and the Baker gold medal is awarded to **Mr. B. M. Hellstrom** for his paper on "The Perak River Hydro-Electric Power Scheme."

Mr. L. C. Forster has been appointed manager for the south western area by the Lightfoot Refrigeration Co., Ltd. He recently joined the company from the Pressed Steel Co., Great Britain, Ltd. (Prestcold refrigerators), with whom he was area manager in the Northern Counties of Scotland and later in the Southern Counties. Mr. Forster will be concerned with the sale of Lightfoot commercial refrigerators and Westinghouse appliances.

Mr. W. Weekes, borough electrical engineer at Shoreditch, is retiring next month after forty years' service.

Mr. G. W. Morgan, deputy assistant mains superintendent at Fulham, has been recommended by the Staff Committee for the appointment of assistant mains superintendent at a commencing salary of £418 per annum.

Mr. L. Breach, A.M.Inst.C.E., M.I.E.E., chief electrical assistant to Mr. P. J. Robinson, city electrical engineer, Liverpool, has given notice of his intention to retire on superannuation. He has been in the service of the Corporation for thirty-two years.

In accordance with the North Metropolitan Electric Power Supply Act, 1937, the undertaking of the Harrow Electric Light & Power Co., Ltd., became vested in the North Metropolitan Electric Power Supply Co. on October 14th. **Mr. W. H. Bishop** has resigned his position as manager of the Harrow Co., but will act for the Northmet Co. in a consultative capacity in connection with the Harrow undertaking. **Mr. N. Axford,** B.Sc., A.M.I.E.E., resident engineer of the Wood Green undertaking of the Northmet Co., has been appointed resident engineer of the Harrow undertaking.

Obituary

Mr. Arthur Townsend, whose death is recorded in the official organ of the American Institute of Electrical Engineers, was born at Southampton, England, in 1875. Between 1891 and 1901 he was employed by various companies in England, and he then entered the electrical testing department of the British Thomson-Houston Co. in London. He was transferred to the technical staff at Rugby in 1903, and left the company three years later to move to Canada, where he installed, owned, and operated the town plant at Milestone, Sask. In 1928 he designed and built a radio station at Pilot Butte, and since 1929 had been chief inspector for the Saskatchewan Power Commission.

Mr. J. K. Stothert.—The death is reported of Mr. John Kendal Stothert, M.I.E.E. He was seventy-six years of age and died at Sidmouth on October 17th.

Mr. E. A. Anderson.—We regret to learn of the death of Mr. E. A. Anderson, A.M.I.E.E., engineer and manager of the Walton and Weybridge U.D.C. Electricity Department, which occurred on October 16th.

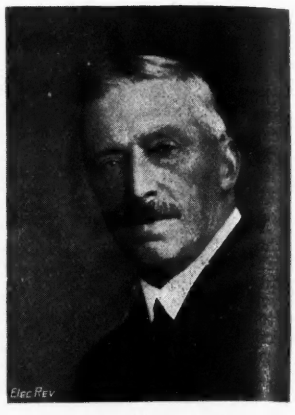
Mr. W. Cross.—The death occurred on October 16th at Alverstone, Ashstead, Surrey, of Mr. William Cross, C.P.A., A.R.S.M., M.I.E.E., and a member of the Faraday Society. He was eighty-one years of age.

Col. Bernard Ismay Rolling, general manager of the Bedford works of the Igranic Electric Co., Ltd., died suddenly at his home, The Mill House, Kempston, Beds., on October 17th at the age of fifty-four. Col. Rolling had this year completed twenty-five years' service with the Igranic Co. (war service excluded). During twenty years of that time he was manager in charge of the Glasgow office for Scotland and Ireland, and for some years was prominently identified with the growing business of the company in moving bridge, steel works plant and large crane control in all parts of the country. Since his appointment in February, 1933, to Bedford, the works there have been continually expanded and the number of employés considerably increased. Col. Rolling was vice-chairman of the Igranic Social and Sports Club, and showed the keenest interest in the many branches of sport fostered under the club's auspices. He leaves a widow and two daughters.

The late Col. B. I. Rolling

Before Col. Rolling entered the employment of the Igranic Electric Co., he was assistant electrical engineer to the Borough of Motherwell. He had a successful military career, and was a survivor of the landing of the 29th Division at Suvla Bay, Gallipoli, and for his outstanding work there and later in France was awarded the D.S.O., the Croix de Guerre, the O.B.E. (Military Division), and was four times mentioned in despatches.

Mr. F. J. Down.—The death occurred at his residence at Glengariff, Harpenden, on October 17th of Mr. Fred J. Down, F.C.S., M.I.E.E., M.Inst.C.E., at the age of eighty-two years. Mr. Down's connection with the electrical trade began in its earliest days, for in 1884 he was a partner in the then well-known firm of Laing, Wharton & Down, who in that year secured the agency here for the American Thomson-Houston Co. His firm exhibited plant at the International Inventions Exhibition of 1885 and received a gold medal for arc lighting equipment shown there. Subsequently, the British Thomson-Houston Co. was formed. Laing, Wharton & Down will also be remembered by some of our older readers as holding agencies for Brill trucks and the Buda Company's products. Some years later Mr. Down acted as an expert to fire assessors in connection with fires at electrical and engineering works. Overhead line work and the suppression of noise and vibration were also subjects to which he devoted much attention. Some five years ago he announced that under medical advice he intended to take things more easily. The funeral service took place on Wednesday at Harpenden.



The late Mr. F. J. Down

Wills.—Mr. S. Jennings, a director of Newman & Watson, left £31,316, with net personalty £26,810.

Sir Frederick C. Gardiner, a director of the Clyde Valley Electrical Power Co., left personal estate in Great Britain valued at £542,552.

Sir Archibald B. Boyd Carpenter, a director of the Jerusalem Electric & Public Service Corporation, left £3,143 (net personalty £2,759).

Professor Magnus Maclean, Professor of Electrical Engineering at the Royal Technical College, Glasgow, and a director of the Craigpark Estate Electric Cable Co., Ltd., left £5,794.

Financial Section

New Companies. Official Returns of Capital. Debenture Charges. Reports of Electrical Companies. Dividend Announcements. Transactions in Stocks and Shares

New Companies Registered

G. B. Industries, Ltd.—Private company. Registered October 13th. Capital, £10,000. Objects: To carry on the business of manufacturers, merchants, factors and traders in all classes of electrical goods and appliances, &c. The subscribers are: L. S. Hudd, 57, Foyle Road, S.E.3, and A. Robson, 1, Gainsborough Buildings, S.W.1. Solicitor: Lucien Fior, 2, Bloomsbury Street, W.C.1.

Decorlite, Ltd.—Private company. Registered October 14th. Capital, £5,000. Objects: To carry on business as manufacturers and designers of and dealers in electrical fittings, electrical and quartz lamps, electrical signs, reflectors, &c. The subscribers are: W. E. Wolf and R. W. G. Mackay, both solicitors, 1 and 2, Finsbury Square, E.C.2. Solicitors: Herbert Oppenheimer & Co., 1 and 2, Finsbury Square, E.C.2.

Morrisons Engineering, Ltd.—Private company. Registered October 14th. Capital, £2,000. Objects: To carry on the business of designers, manufacturers and repairers of and dealers in aircraft of all kinds; radio, electrical, general and mechanical engineers, &c., and to adopt an agreement between Wedderburn and Burn, Ltd., of the one part and G. P. McGiveney of the other part. The directors are: G. P. McGiveney, 116, Woodcote Grove Road, Coulsdon, Surrey, and R. V. Wrightson, address not stated. Registered office: 9, Cherry Orchard Road, Croydon, Surrey.

British Tempovox, Ltd.—Private company. Registered October 9th. Capital, £1,000. Objects: To carry on the business of manufacturers, importers and repairers of and wholesale and retail dealers in radio transmitting and receiving sets, television sets, electrical goods and appliances, &c. The subscribers are: G. H. Harrison, 15, Warwick Close, Hampton, Mdx; and Ian M. McLeod, 4, Cardinal Walk, Hampton. I. M. McLeod is the first director.

Suplex Lamps, Ltd.—Private company. Registered October 11th. Capital, £1,000. Objects: To carry on the business of importers, exporters and manufacturers of and dealers in electrical goods of all kinds, including lamps, radio articles and electrical fittings and accessories, &c. The directors are: H. L. Segal, 90, Princes Park Avenue, Golders Green, N.W.11; and I. Krieger, 11, Shirehall Gardens, Hendon, N.W.11. Registered office: 69, Farringdon Road, E.C.1.

Majestic Electric Co. (1937), Ltd.—Private company. Registered October 14th. Capital, £250. Objects: To carry on the business of manufacturers of and dealers in gramophones and sound producing machines, picture producing, reproducing or transmitting apparatus, electricians, radio and electrical engineers, &c. The directors are: A. E. Baker and Mrs. G. J. Baker, both of 241, Firs Lane, Winchmore Hill, N.20.

Returns of Electrical Companies

Lynton and Lynmouth Electric Light Co., Ltd.—The nominal capital has been increased by the addition of £10,000 in £1 ordinary shares beyond the registered capital of £10,000.

Revo Electric Co., Ltd.—Capital, £500,000 in 10s. shares. Return dated July 6th, 1937. 700,000 shares taken up. £228,150 paid on 456,300 shares. £121,850 considered as paid on 243,700 shares. Mortgages and charges, nil.

Electric Furnace Co., Ltd.—Capital, £200,000 in 100,000 preferred ordinary and 100,000 ordinary shares of £1. Return dated July 13th, 1937. 85,500 preferred ordinary and 78,250 ordinary shares taken up. £19,750 paid on 13,500 preferred ordinary and 6,250 ordinary shares. £144,000 considered as paid on the remainder. Mortgages and charges nil.

J. S. Ramsbottom & Co., Ltd.—Capital, £1,000 in £1 shares. Return dated July 7th, 1937. All shares taken up. £1,000 paid. Mortgages and charges, nil.

Station Radio, Ltd.—Capital, £200 in £1 shares. Return dated July 3rd, 1937. Twenty-two shares taken up. £22 paid. Mortgages and charges: £300.

Alandale Radio & Television Co., Ltd.—A. E. Stevens, of 100, Canberra Road, Charlton Park, S.E.7, ceased to act as receiver and manager on September 30th, 1937.

Forward Electric Co., Ltd.—Debenture charged on freehold land and buildings in Kingstanding Road, Perry Barr, Birmingham, and the company's undertaking and other property, present and future, including uncalled capital, dated September 21st, 1937, to secure all moneys due or to become due from the company to Lloyds Bank, Ltd.

British Television Supplies, Ltd.—Debenture charged on the company's undertaking and property, present and future, including uncalled capital, dated October 4th, 1937, to secure £500. Holders: Peto Scott Co., Ltd., 77, City Road, E.C.1.

G. P. Cosway, Ltd.—Particulars filed of £800 debentures, authorised September 30th, 1937, charged on the company's undertaking and property, present and future, including uncalled capital, the amount of the present issue being £400.

Telephone Trading Co., Ltd.—Capital, £1,000 in £1 shares. Return dated July 6th, 1937. All shares taken up. £1,600 paid. Mortgages and charges, nil.

G. P. Cosway, Ltd.—Issue on October 8th, 1937, of £400 debentures, part of a series already registered.

Ramsbottom Relay, Ltd.—Capital, £500 in £1 shares. Return dated June 23rd, 1937. All shares taken up. £500 paid. Mortgages and charges nil.

Electric Construction Co., Ltd.—Capital, £400,000 in 100,000 preference and 300,000 ordinary shares of £1. Return dated July 9th, 1937. 62,780 preference and 300,000 ordinary shares taken up. £116,490 paid on 36,490 preference and 80,000 ordinary shares, £246,290 considered as paid on 26,290 preference and 220,000 ordinary shares. Mortgages and charges: £112,960.

City Notes

Potters, Ltd., held their annual meeting on October 14th, when Mr. A. P. Good (chairman), who presided, said that so far as the future of the company was concerned he felt assured that provided they could get some co-ordination and co-operation in the trade generally it would be possible to put the company's earning power on a basis which it had never been able to achieve in the past few years. During the year under review the trouble in Spain had lost them quite an important foreign market, and the war in the Far East was also likely to affect markets. In many countries also they were faced with frozen credits, quotas, blocked accounts and insurmountable tariff walls, but in spite of all these difficulties to international trade they had been able to maintain, and they were increasing, their turnover. Total exports of oil engines from this country were likely to be £3,000,000 this year. Imports in 1936 were only half a million, of which nearly £400,000 entered the country free of duty, as they were consigned to registered shipyards under the Import Duties Act. Their contention was that this concession was not now necessary, and that the internal combustion engine industry should not be called upon to suffer this disadvantage. To offset the rise in labour and material costs a thorough review of the process of manufacture of engines had been instituted and they were trying by new and improved methods of production and by redesign to cheapen the costs of production. This policy had had certain success already and the benefit of these reductions had been passed on to the customer in the form of reduced prices in the export trade. Since the close of the financial year they had acquired the whole of the share capital of an important engineering undertaking and further negotiations were in progress with a view to consolidating manufacturing interests and eliminating wasteful competition. The number of orders at present in hand was substantially more in number of engines, in total b.h.p. and in sterling value than at the corresponding period last year and turnover had risen.

Following the annual meeting, meetings of the preference and ordinary shareholders and an extraordinary general meeting were held at which the scheme of capital reconstruction was adopted.

The Perak River Hydro-Electric Power Co., Ltd., held its annual meeting on October 13th when Mr. G. Balfour (chairman), who presided, said that the maximum load during the year was 41,600 kW and the minimum load never fell below 34,900 kW, the load factor being nearly 75 per cent. The output was approximately 273 million kWh, as compared with 213.5 million kWh in the previous year. Of this total 171 million kWh was generated by the hydro-electric power stations, as compared with 173 million kWh during the previous year, the fall being due to the drought conditions in the Perak River. The output of the steam generating stations was 102 million kWh as compared with 40 million kWh in the previous year, an increase of 155 per cent. They had to act promptly in providing extensions to the steam plants at Malim Nawar and Batu Gajah. The additional 12,000 kW plant and additional boilers at Malim Nawar with auxiliary works were now ready for service and additional boilers and turbine plant at Batu Gajah had been put in hand. In addition, new sub-stations and additional transmission lines and switchgear were being erected. During the period of serious depression transmission lines had to be forced to the limit of their capacity and a great deal of capital work had to be carried out during the last two years to bring the transmission system into first-class order sufficient for the requirements of the increased load. In addition, their expenditure on revenue account was increased by charges for deviating lines and generally bringing the maintenance up to a high standard. The small Kinta undertaking was making substantial progress. As the whole of the capital was now issued and fully paid, it would be necessary towards the end of the current financial year to increase the capital as the directors proposed to use every endeavour to avoid creating any new charge on the company's assets. With regard to the current year, their capital charges would not show any heavy increase, as the capital provided last year would cover their commitments for some months to come. On the other hand, judging by their returns since the close of the financial year, the net revenue should continue to show a satisfactory increase. Their chief concern would be to cope with the growing demand.

The Mid-Cheshire Electricity Supply Co., Ltd., is holding an extraordinary meeting to-day (Friday), at which a resolution will be submitted for increasing the capital from £300,000 to £700,000 by the creation of 400,000 additional shares of £1 each. In order to carry out the purchase of 345,475 ordinary £1 shares in the Mersey Power Co., Ltd., the meeting will also be asked to agree to directors being empowered to borrow from the Westminster Bank, Ltd., a sum not exceeding by more than £400,000 the amount authorised by Article 81. In a circular to shareholders the company states that in the appendix to the Ministry of Transport's Memorandum "Electricity Distribution, Outline of Proposals," the greater part of Cheshire was shown under one Group (No. 17), the centre of which was the area now controlled by the Mid-Cheshire Electricity Supply Co., Ltd. The company, as the centrally placed undertaking in Group 17, has approached each of its neighbours with a view to entering into negotiations in order to facilitate a scheme of amalgamation. The result to date has been the completion of negotiations for the purchase of the majority of the ordinary shares of the Mersey Power Co., Ltd. The directors are satisfied that the purchase of the shares in the Mersey Power Co., which together with the Mid-Cheshire Company sells over 50 per cent. of the kWh sold in Group 17, will be an important step in the further development of electricity distribution in Cheshire.

Murex, Ltd., held its annual meeting on October 14th, when Mr. G. P. Joseph (chairman), who presided, said that at their Rainham works large extensions, both in buildings and plant, had been completed, but there was still heavy capital expenditure in front of them for further additions under both heads. Their subsidiary company, Murex Welding Processes, had again shown considerable expansion. There had been long and unavoidable delays in getting the steel necessary for the construction of the factory on their Freezywater site, but good progress was now being made, and they hoped that they would have the factory buildings completed by about the end of the year. The welding industry continued to expand, and their output, sales and profits had again shown a satisfactory increase. Competition had also increased, and they felt that in order to maintain their position and continue successfully to meet such competition they must bring costs down wherever possible. The new factory at Freezywater would assist to that end. They had again this year made a distribution in the form of a cash bonus to the staff of Murex, Ltd., and Murex Welding Processes. The new financial year had opened well and their trade for the first quarter showed a satisfactory increase over the corresponding period of last year.

Associated Fire Alarms, Ltd., held its annual meeting on October 12th, when Mr. G. H. Brown (chairman), who presided, said that the expansion of their business had continued. The direct connection of their installations with London Fire Brigade stations was proving satisfactory, and during the year under review new receiving equipments were installed at three more London Fire Brigade stations at Shaftesbury Avenue, Kensington and Kentish Town—making a total of six stations in London. There were also nearly 300 London installations connected with their fire call station in their own offices. The number of cities and towns in the provinces where their installations were directly connected with the fire brigade stations was now fifty-two.

The St. Austell and District Electric Light & Power Co., Ltd., has announced an interim dividend of 5 per cent., actual, less tax (same), on the ordinary shares Nos. 301 to 7,000, 20,0001 to 30,000 and 47,001 to 66,300 and 10 per cent. per annum, calculated from due dates of payment of calls, on ordinary shares Nos. 66,301 to 70,300.

Erinoid, Ltd., reports a net profit for the year ended July 31st of £23,075, as compared with £31,752 in the preceding year. The directors state that there has been a decrease in sales owing to a temporary change in the fashion trades affecting the demand for Erinoid. Two new processes—in addition to "Erinfort"—are being developed to produce materials for which there is a wide and stable market. Income-tax reserve receives £5,666, and it is proposed to pay a final ordinary dividend of 5 per cent., making 8 per cent. for the year (against 10 per cent.). This leaves £4,846 to be carried forward (against £6,433 brought in).

Philips' Incandescent Lamp Works Holding Co., of Eindhoven, reports a net profit of fl.19,673.975 (£2,186,000) for 1936-37, as compared with fl.4,063,910 (£451,000) in the preceding year. The ordinary dividend is raised by 12½ per cent. to 18½ per cent., and the preference shares receive 8½ per cent. (against 6 per cent.).

The British Aluminium Co., Ltd.—The Power Securities Corporation announces that the issue to shareholders of 1,000,000 ordinary shares of £1 at 42s. 6d. per share has been subscribed to the extent of 92 per cent., leaving 8 per cent. to be taken up by the underwriters.

Ensign Lamps, Ltd., reports a trading profit for the six months ended June 30th of £14,001. A dividend at the rate of 20 per cent. per annum is paid on the ordinary shares for the six months and £6,451 is carried forward.

The Atlas Electric & General Trust has announced an interim dividend of 3½ per cent. on the 7 per cent. cumulative preference shares.

The Investors' Gas & Electric Trust has announced a distribution of 5.02225d. net per sub-unit after deduction of income tax (against 3.6315d.).

The Cawnpore Electric Supply Co. has declared an interim ordinary dividend of 3 per cent. (same).

The Ebonite Container Co. is maintaining the interim dividend at 4 per cent.

Stocks and Shares

TUESDAY EVENING.

THE principal feature in the Stock Exchange markets at the present time is the fresh fit of depression caused by a severe fall in prices of stocks and shares connected in any way with the United States. A Yankee slump, as it is called, is by no means unknown to the Stock Exchange, but that which has occurred during the past few business days has exceeded in severity anything of the same sort since 1932. All sections of the American market have suffered: railroad, utility, industrial, oil, &c. The fall has been brought on by various reasons mentioned here from time to time.

A slump of this sort acts in snowball fashion, one decline producing many others. The effect is felt throughout most of the markets, even in those that might be supposed to stand far removed from the influence of American affairs. The psychological effect is to lay a restraint upon the initiative of investment and speculation alike. Moreover, some people have to sell shares in good companies in order to meet losses which they have incurred in other directions.

Had it not been for the American slump, Stock Exchange markets would probably have been rather better, because money is not only abundant but also is willing to seek Stock Exchange avenues for its employment, provided that the latter can offer anything approaching security and a permanence of firmness. The prices of rubber, base metals and commodities have been forced down by the American flatness, in the face of which other considerations, political and financial, have been almost ignored.

Parliamentary Programmes

Parliament meets on Thursday in this week, and, after a debate on foreign affairs, will be prorogued until next Tuesday, October 26th. The new session is expected to take in hand, amongst many other important matters, the questions arising out of the proposed reorganisation of electricity supply. Later in the year the Japanese Diet is to arrive at some definite conclusion on the point of the suggested State control of the electrical industry in Japan.

Electricity Supply

The list of prices for Home electricity supply shares again shows, this week, scarcely a quotable movement. The market has been one of the few sections of the Stock Exchange to escape from any noticeable sympathy with the general depression. In the overseas group Perak Hydro-Electrics came in for a good deal of attention after the annual meeting. The shares have lately been a good market by reason of the raising of the dividend to 7 per cent., and of the increase in last year's profits. The price went ahead on the chairman's review of the company's position and prospects; he anticipated for the current year a further expansion in demand and in revenue. Another increase in capital was foreshadowed. The price of the shares, at 25s. 3d., went ex dividend last Monday. Palestine Electric A at 34s. are scarcely affected by the latest disturbances in the country.

Traction Stocks

London Transport "C" stock has come in for a certain amount of profit-taking, but the price, at 79 ex dividend, still retains about half a dozen points of the jump which followed the unexpectedly good dividend announcement. The Home Railway market reflects disappointment with the showing made by the latest traffic returns, the first to cover the higher charges for fares and freights. British Electric Traction deferred recovered 25 of the previous week's 100 points drop, but Tillings, at 58s., are no better. No particular reason has been offered to explain a rather abrupt drop in West Ridings, which stand half-a-crown lower at 2. Brazilian Tractions have gone back to 3⅜, an abnormally heavy drop for these shares. As mentioned here last week, Brazilian Tractions are one of the storm-spots in the American market débâcle.

The Yankee Slump

Cable and Wireless stocks remain in friendless condition, with the ordinary no better than 67½. The preference, after going under par, recovered to 100⅛. Globe Telegraph preference shed ⅛, to 14⅛, and Great Northerns 1, to 39. Marconi-Marines fared better, rising 1/16 to 33s. 9d. American "Tel. and Tel." suffered a loss of 9 points in the Wall Street slump: the price went back to 150½. Internationals dropped 1 to 5⅛, but partially recovered to 6. Western Unions are 2 down at 29. Shares of all classes are more or less affected by the same unhappy cause. Electric and Musical Industries fell a florin to 15s. 6d. in less than an hour, and Canadian Marconis, 5s. at three o'clock in the afternoon, were 3s. 9d. at four. Rubber, the raw material, has given way sharply. All the base-metal prices are down.

Equipment and Manufacturing Shares

The following group of electrical equipment and manufacturing ordinary shares is offered by way of a supplement to the list which regularly accompanies this column. The dividends are those paid for the last full year:—

Share.	Price.	Dividend %	Yield % £ s. d.
Automatic Telephone	2	10	5 0 0
Crabtree Electrical (10/–)	30/3	17½	5 15 9
Consolidated Signal	5½	30	5 14 3
Chloride Electrical	4	15	3 15 0
Ismay Industries (5/–)	5/9	6	5 4 4
Reyrolle	3	12½	4 3 4
Switchgear and Cowans (5/–)	17/–	20	5 17 8
Walsall Conduits (4/–)	25/9	20 (interim)	

Most of the prices quoted are some way below their recent best levels.

Home Industrials

Industrial markets have remained, during the past week, in chastened mood, but signs of returning vitality are not altogether lacking. Potential buyers of industrials have one eye on the progressive state of affairs at home, and another on the possibility of further disturbances arising out of political events, or out of more distress selling by discomfited speculators. It has come to be realised, too, that the present indecisive course of business activity in America is going to have an important say in the future of our own trade. The bargain-hunter, tempted by the 4½ per cent. yields which he can at present obtain from high-class Home industrial shares, has plenty to make him think before he leaps. For this reason anything like a dramatic revival in markets is scarcely to be expected while so much remains uncertain in the realms of politics, finance and trade. Among electrical equipment shares the tendency is for prices to harden slightly. General Electrics, now 78s., and Associated Electricals, at 44s. 6d., have made modest improvements. Both are on a yield-basis of about 4½ per cent. Crompton Parkinsons, at 2⅞, are noticeably stronger. Enfield Cables, at 5⅞, have gained 1/16; British Insulated have lost a similar fraction, to 4⅞. There are small gains in Siemens, at 30s. 9d., and English Electrics, at 30s. 6d.

Share List of Electrical Companies

Home Electricity Companies.

	Nom.	Dividend. Previous.	Dividend. Last.	Price Oct. 19.	Rise or Fall.	Yield p.c. £ s. d.
Bournemouth and Poole	1	15	15	67/6	—	4 9 0
City of London	1	7½	7½	34/6	—	4 7 0
Clyde Valley	1	7	8	40/6	—	3 19 0
County of London...	1	10½	10½	49/–	—	4 5 9
Edmundson's 7% Pref.	1	7	7	33/6	—	4 3 7
Do. Ord.	1	8	9	39/–	—	4 12 4
Elec. Dis. Yorkshire	1	9	9	41/6	—	4 6 10
Elec. Fin. and Securities	1	12½	12½	2⅝	—	4 15 3
Elec. Supply Corporation ...	1	11	12	52/6	—	4 11 5
Lancs Light and Power	1	7½	7½	32/6	—	4 12 4
Lond. Assoc. Electric	1	—	7	31/3	—	4 9 6
London Electric	1	7	8	35/6	—	4 10 2
London Power Deb. Red. ...	Stock	5	5	105½	—	4 14 9
Metropolitan	1	10	10	46/–	—	4 7 0
Midland Counties	1	7½	8	37/6	—	4 5 4
Mid. Elec. Power	1	8	9	2½	—	4 4 8
North Eastern Electric Ordinary	1	6	7	31/6	−6d.	4 9 0
Do. 7% Pref.	1	7	7	34/–	—	4 2 4
Northampton	1	10	10	45/–	—	4 9 2
Notting Hill 6% Pref.	10	6	6	14	—	4 5 9
North Met. Elec. Ordinary ...	1	10	10	48/9	—	4 2 1
Do. do. 6% Pref. ...	1	6	6	30/6	—	3 19 8
Scottish Power	1	8	8	37/–	+6d.	4 6 6
South London	1	7	7	32/–	—	4 7 6
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	22/–	—	6 16 4
Yorkshire Elec.	1	8	8	2	—	4 0 0

Public Boards.

Central Electricity, 1950–70 ...	Stock	5	5	112½	—	4 9 0
Do. 1955–75 ...	„	5	5	115	—	4 7 0
Do. 1951–73 ...	„	4½	4½	109	—	4 2 7
Do. 1963–93 ...	„	—	3½	98	+½	3 11 5
London Elec. Trans. Gtd. ...	„	—	2½	90	—	2 15 6
London & Home Counties, 1955–75	„	4½	4½	111	—	4 1 1
London Passenger Transport, A...	„	—	4½	113½	—	3 19 4
Do. do. B...	„	—	5	117½	—	4 5 1
Do. do. C...	„	4	4½	79xd.	−1	5 7 8
West Midlands Joint Elec. 1948–68	„	—	5	112	—	4 9 3

Telegraph and Telephone.

American Tel. & Tel.	$160	9	9	150½	−9	5 19 7
Anglo-Am. Tel. Pref.	Stock	6	6	115½	—	5 4 0
Do. Def.	„	1½	1½	29½	—	5 1 8
Cable & Wireless 5½% Pref. ...	„	4½	5½	100½	+1	5 9 5
Do. Ord.	„	—	—	67⅞	−1	—
Do. Income	„	—	—	101½	—	3 18 10
Globe Tel. & Tel. Ord.	10	4½*	5½*	16	—	3 8 8
Do. do. Pref.	10	6	6	14½	−½	4 12 0
Great Northern Tel.	10	20	20	39	−1	5 2 7
Marconi-Marine	1	10	7½	33/9	+1/16	4 9 0
Oriental Telephone Ord.	1	12*	12*	2 19/32xd.	—	4 0 0

Home and Foreign Trams, etc.

Anglo-Arg. Trams First Pref. ...	5	Nil	Nil	5/–	—	—
Do. do. 2nd Pref.	5	Nil	Nil	3/9	—	—
Do. do. 5% Deb.	Stock	Nil	Nil	17½	−1	—
British Electric Traction Def. Ord.	„	5	5	1075	+25	—
Do. do. Pref. Ord.	„	8	8	168	—	4 15 5
Brazil Traction	$100	40cts.	50cts.	15⅝	−3/8	—
Brit. Columbia Elec. Rly. Pcs. ...	Stock	5	5	105½	—	4 14 9
Mexican Light Common	$100	Nil	Nil	2	—	—
Do. 1st Bonds	$500	5	5	33	—	—
Victoria Falls Ord.	1	20	12	3	−1/16	4 0 0
West Riding	1	6½	10	2	−⅛	5 0 0

Manufacturing Companies.

Aron Electricity Ord.	1	15	15	2⅝	—	6 6 4
Assoc. Elec. Ord.	1	8	10	44/6	+6d.	4 9 10
Do. Pref.	1	8	8	37/6	—	4 5 3
Babcock & Wilcox	1	8	10	45/–	+1/6	4 9 0
British Aluminium Ord.	1	7½	10	45/–	+6d.	4 9 0
British Insulated Ord.	Stock	20	20	4⅛	−1/16	4 6 6
Brush Ord.	Stock	Nil	Nil	32⅛	−1	—
Callender's...	1	15	15	4 1/16xd.	—	3 7 8
Do. 6½% Pref.	1	6½	6½	31/3	—	4 2 4
Crompton Parkinson Ord. ...	5/–	12½	12½	2 3/16	+⅛	—
Do. 8% Pref.	1	8	8	37/6	—	4 5 4
Electric Construction	1	7	10	1 13/16	−1/16	5 10 4
Enfield Cable Ord.	1	25	25	5 7/16	+1/16	4 17 0
English Electric	1	Nil	Nil	30/6	+6d.	—
Do. do. Pref.	1	6½	6½	26/6	—	4 18 1
Ericsson Tel.	5/–	20	25	2 1/8xd.	—	2 17 2
Ever Ready	5/–	35	45	29/3	—	7 13 7
Ferranti Pref.	1	7	7	27/6	—	5 1 10
G.E.C. Pref.	1	6½	6½	32/6	—	4 0 0
Do. Ord.	1	15	17½	78/–	+6d.	4 9 9
Henley's	5/–	30	15	18/9	—	4 0 0
Do. 4½% Pref.	1	4½	4½	1½	—	4 0 0
India-Rubber Pref.	1	5½	5½	21/3	—	5 3 6
Johnson & Phillips	1	7½	10	42/6	—	4 14 1
Lancashire Dynamo	1	10	20	3⅜	—	5 18 6
Siemens Ord.	1	6	7½	30/9	+9d.	4 17 7
Telegraph Construction	£1	Nil	7½	2½	—	3 6 8

* Dividends are paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged and all subsequent proceedings will be taken.

1936

1849. "Electro-magnetically operated mercury switches." A. Cianchi. January 20th, 1936. (472250.)
3789. "Electric protective arrangements." E. A. Fowler, L. Hyman and W. E. Oughton. February 4th, 1937. (472312.)
4935. "Means for controlling the excitation of dynamo-electric machines." English Electric Co., Ltd., H. S. Carnegie and J. C. Wilson. February 18th, 1936. (Cognate application 3893/36.) (472472.)
5217. "Electro-magnetic measuring apparatus." N. S. Muir. February 21st, 1936. (472313.)
5273. "Transmission dynamometers." N. S. Muir. February 21st, 1936. (472317.)
5304. "Cathode-ray tubes." V. Zeitline, A. Zeitline and V. Kliatchko. February 22nd, 1935. (Cognate application 5305/36.) (472539.)
5779. "Glass-vessel metal vapour current rectifiers having control electrodes." Semens-Schuckertwerke Akt.-Ges. March 12th, 1935. (472542.)
7254. "Electric control systems for regenerative braking of direct-current motors." British Thomson-Houston Co., Ltd., H. W. C. Liddiard and T. H. Petch, jun. March 10th, 1936. (472394.)
8109. "Thermionic amplifiers." Standard Telephones & Cables, Ltd., and A. H. Roche. March 18th, 1936. (472256.)
8122. "Electric switches." General Electric Co., Ltd., and E. H. Croft. March 18th, 1936. (472399.)
8135. "Electric systems for the remote transmission and indication of angular movement." British Thomson-Houston Co., Ltd., and L. J. Clark. March 18th, 1936. (472259.)
8136. "Control gear for variable-speed alternating-current motors." British Thomson-Houston Co., Ltd., and T. J. F. Oldham. March 18th, 1936. (472260.)
8229. "Control device for variable condensers, applicable also to other purposes." A. Thomas. March 19th, 1935. (472267.)
8292. "Methods and/or apparatus for impregnating electric articles and devices, particularly electric condensers." Dubilier Condenser Co. (1925), Ltd. March 19th, 1935. (472272.)
8330. "Electrode boilers." S. C. Harling. March 20th, 1936. (472479.)
8357. "Telekinematographic and like apparatus." Baird Television, Ltd., and G. Dovaston. March 20th, 1936. (472274.)
8358. "Television and like systems." Baird Television, Ltd., V. A. Jones and P. W. Willans. March 20th, 1936. (472401.)
8379. "Electric-discharge lamps." Siemens Electric Lamps & Supplies, Ltd., and J. N. Aldington. March 20th, 1936. (472275.)
8383. "Telephone or like systems." Standard Telephones & Cables, Ltd., E. P. G. Wright and L. P. Lowry. March 20th, 1936. (472402.)
8384. "Testing arrangements for electrically conducting lines." Standard Telephones & Cables, Ltd., and K. E. Latimer. March 20th, 1936. (472277.)
8390. "Electric time-delay switches." L. Uriga and H. Lewin. March 20th, 1936. (Convention date not granted.) (472481.)
8391. "Time-delay electric switches." L. Uriga and H. Lewin. March 20th, 1936. (Convention date not granted.) (472482.)
8394/5. "Apparatus for the electro-deposition of metals." R. H. Adey. March 20th, 1936 (472278/9.)
8400. "Telephone systems." J. E. Pollak (Associated Electric Laboratories, Inc.). March 20th, 1936. (472280.)
8438. "Make-and-break contact apparatus." British Thomson-Houston Co., Ltd., and H. De B. Knight. March 20th, 1936. (472283.)
8442. "Cathode-ray tubes." F. H. Nicoll. March 20th, 1936. (472284.)
8448. "Electrically operated clocks." M. Schild. June 17th, 1935. (472285.)
8524. "Arc-rectifiers." British Thomson-Houston Co., Ltd. March 21st, 1935. (472286.)
8525. "Welding electrodes." British Thomosn-Houston Co., Ltd. March 21st, 1935. (472323.)
8528. "Electric-discharge devices." Universag Technische Akt.-Ges., and D. Gabor. March 21st, 1936. (472543.)
8574. "Electron-discharge devices." Baird Television, Ltd., and T. M. C. Lance. March 23rd, 1936. (472485.)
8691. "Electric switches or circuit breakers." Circuit Breakers, Inc. June 18th, 1935. (472496.)
8812. "Electric lamps." H. A. McGunnigle. March 24th, 1936. (472606.)
8855. "Voltage and like regulating systems utilising discharge valves." N. W. J. Lewis. March 25th, 1936. (472326.)
8863. "Prepayment electricity and other like meters." Chamberlain and Hookham, Ltd., and S. James. March 25th, 1936. (472552.)
9062. "Electric resistor construction and method of making the same." International Resistance Co. July 2nd, 1935. (472408.)
9129. "Maximum demand instruments for use in electricity supply systems." Chamberlain and Hookham, Ltd., and S. James. March 27th, 1936. (472609.)
9217. "Electrically heated furnaces." G. Siebert Ges. April 1st, 1935. (472611.)
9381. "Thermionic electrodes." General Electric Co., Ltd. (Patent-Treuhand-Ges. für Elektrische Glühlampen.) April 3rd, 1936. (472333.)
10456. "Oscillographs." W. and J. George, Ltd., and C. W. W. Read. April 9th, 1936. (472417.)
11324. "Arc convertors." Allgemeine Elektricitats-Ges. April 18th, 1935. (472336.)
11327. "Electric arc convertors." Allgemeine Elektricitats-Ges. April 18th, 1935. (472421.)
11335. "Electrical wall sockets." W. F. Brown, and Ranton and Co., Ltd. April 21st, 1936. (472422.)
14267. "Electric warp stop motions for mechanical looms." Gron and Co., Ltd. Aug. 9th, 1935. (Cognate application 14268/36.) (472341.)
16471. "Electric generators." W. A. White and W. R. G. Whiting. June 12th, 1936. (472505.)
17103. "Electric signalling systems." Standard Telephones and Cables, Ltd., and E. A. H. Bowsher. June 19th, 1936. (472431.)
18066. "Arrangements for automatically interconnecting adjacent sections of trolley-bus, tramway and other electric distribution systems." W. V. Edwards and F. J. Cunuder. June 30th, 1936. (472506.)
19614. "Electric insulators." G. MacLellan and Co., Ltd., and W. Grey. July 15th, 1936. (472507.)
19777. "Determination of the zone value of connections such as telephone connections." Telefonbau und Normalzeit Akt.-Ges. November 13th, 1935. (472439.)
20107. "Circuit arrangements for measuring a component of an alternating current or of an alternating potential." Siemens and Halske Akt.-Ges. July 25th, 1935. (472441.)
21391. "Generators of electric saw-tooth oscillations." Compagnie pour la Fabrication des Compteurs et Matériel d'Usines à Gaz. August 21st, 1935. (472293.)
21718. "Radio and like apparatus." Marconi's Wireless Telegraph Co., Ltd. August 29th, 1935. (472351.)
22373. "Modulated carrier-wave signalling systems." Marconi's Wireless Telegraph Co., Ltd. August 22nd, 1935. (472352.)
26739. "Current collector trolley heads." G. V. Stanley and London Passenger Transport Board. October 2nd, 1936. (472568.)
26763. "Carbon electrode holders for carbon arc lamps." C. H. Champion and Co., Ltd. (Projector Improvement Co., Inc.). October 2nd, 1936. (472449.)
27453. "Electric incandescent lamps." Soc. Belge des Lampes à Incandescence Luxor Soc. Anon. October 11th, 1935. (472356.)
28399. "Automatic switches for telephone systems." J. E. Pollak. (Associated Electric Laboratories, Inc.) March 20th, 1936. (Divided out of 8400/36.) (472295.)
29530. "Thermostatically controlled electric appliances. T. Stiebel. October 30th, 1936. (472573.)
29957. "Electrically heated shoes for ironing machines." Beatty Bros., Ltd. December 3rd, 1935. (472360.)
32048. "Carbon arc welding." Elin Akt.-Ges. für Elektrische Industrie. November 21st, 1935. (472363.)
33342. "Electrolytic condensers and the like." Mallory Patents Holding Co., Ltd. (P. R. Mallory and Co., Inc.) December 4th, 1936. (472365.)
35760. "Systems of connections for X-ray tubes having a rotary anode." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. January 2nd, 1936. (472367.)

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2317. "Electrode for arc-welding metal pieces of higher thermal conductivity, such as of copper and copper-rich alloys, by Slavianoff's method." W. Lessel. January 29th, 1936. (472371.)
2952. "Apparatus for transmitting short impulses of high-frequency energy." Telefunken Ges. für Drahtlose Telegraphie. February 1st, 1936. (472580.)
3344. "Radio and like receivers." Marconi's Wireless Telegraph Co., Ltd. September 23rd, 1936. (472520.)
2980. "Working of Röntgen tubes under high voltages." Siemens-Reiniger-Werke Akt.-Ges. February 18th, 1936. (472296.)
5066. "Electrolytic condensers." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. February 22nd, 1936. (472377.)
5435. "Connections for aluminium conductors of electricity." British Thomson-Houston Co., Ltd. February 27th, 1936. (472582.)
6092. "Electron-discharge devices." Marconi's Wireless Telegraph Co., Ltd. February 29th, 1936. (472583.)
6886. "Magnetos." J. Bernard. March 10th, 1936. (472585.)
8203. "Radio communication systems." Standard Telephones and Cables, Ltd. July 31st, 1936. (472586.)
9638. "Thermionic amplifiers." Siemens and Halske Akt.-Ges. April 4th, 1936. (472590.)
9743. "Electric heating plates." E. Challet. April 6th, 1936. (472528.)
10158. "Arrangement of start-stop regenerative repeaters for two-way repetition of signals." Standard Telephones and Cables, Ltd. April 16th, 1936. (472529.)
11942. "Electric condensers." Ideal Werke Akt.-Ges. für Drahtlose Telephonie. May 8th, 1936. (472593.)
12171. "Aerial structures and arrangements." Telefunken Ges. für Drahtlose Telegraphie. April 28th, 1936. (472534.)
13882. "Electric-discharge tubes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. May 18th, 1936 (Cognate application 13883/37.) (472307.)
18089. "Devices for starting mercury-cathode discharge tubes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken." July 2nd, 1936. (472537.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from October 13th :—

Vactric. No. 579578. Class 6. Vacuum cleaning machines, floor polishing machines, electric motors, electric fans and blowers.—Vactric, Ltd., 24, Basinghall Street, E.C.2.

Britlok. No. 578272. Class 13. Electrical lighting and heating fittings of ordinary metal.—C. H. Parsons, Ltd., Britannia Works, Tyseley, Birmingham.

Superstyrex. No. 574958. Class 50. Electrical insulating materials made of vinyl polymerisation products.—Standard Telephones & Cables, Ltd., Connaught House, 63, Aldwych, W.C.2.

Dykanol. No. 577992. Class 50. Compound made of waxes, mineral jellies, synthetic resinous substances or bituminous substances for electrical insulating purposes, and electric insulating liquids.—Dubilier Condenser Co., (1925), Ltd., Ducon Works, Victoria Road, North Acton. W.3.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Barking.—Extensions to factory, River Road, for the Forrest Printing Ink Co., Ltd.; N. Beard, architect, 5, Trent Gardens, Seven Kings.

Barnard Castle.—Houses (29); Smart Walker, architect, Cockfield, Co. Durham.

Barrhead (GLASGOW).—Copper works, Paisley Road, for the Yorkshire Copper Co., Ltd., Leeds.

Benfieldside (Co. DURHAM).—Houses (209), for the North-Eastern Housing Association; J. J. Eltringham, architect, Derwent Street, Blackhill.

Birmingham.—Block of offices to be known as "Cavendish House," 39 to 41, Waterloo Street, for J. Cotton, 35, Waterloo Street, Birmingham. Block of shops and flats, Alcester Road, for Zenas Webb, 56, Moseley Village.

Blackburn.—Dwellings (124), Higher Hill Farm site; borough engineer, Town Hall.

Brecknockshire.—School, Sennybridge, for C.C.; H. C. W. Strickland, Watton Offices.

Brighton.—Flats (42) and shops, High Street, Rottingdean; Central London Trust, Ltd.

Buckie.—Reconstruction of the Palace Cinema for the Highlad Cinema Co., Inverness; Alister G. Macdonald, chartered architect, Edinburgh.

Cardiff.—Houses (1,000), for British Builders, Ltd., 33, Corn Street, Bristol.

Chelmsford.—Cinema with café, Tindal Square, for the Gaumont-British Picture Corporation, Ltd.; W. E. Trent. architect, New Gallery House, Regent Street, London, W.1.

Chesterfield.—Houses (38), near Brockwell Lane; F. Longden. Houses (20), Walton Road; I. D. Wilcockson. Enlargement to Brambling House school (£10,115); W. Marriott.

Congleton.—Extensions to school (£12,950) for E.C.

Dartford.—Houses (20), Marcus Road; Lennox Estates, Ltd. Extensions to Livingstone hospital, East Hill; governors.

Derbyshire.—Enlargement of school, Swadlincote (£10,348), for County E.C.

Doncaster.—Factory premises, Churchill Road, for the Elleurite Corrugated Containers, Ltd.

Douglas (I.O.M.).—Houses (14), St. Catherine's Drive; T. & F. Chapman.

East Ham.—Maternity Department, Memorial Hospital (£30,000); Governors.

Ebbw Vale.—Houses (398); U.D.C. surveyor.

Edinburgh.—Air-raid protection station, offices, &c., Russell Road (£20,000), for the Cleansing Department; burgh surveyor.

Ewell.—Cinema with shops, Kingston Road; E. Norman Bailey, architect, Bridge Road, Maidenhead.

Falkirk.—Extensions to stores for F. W. Woolworth & Co., Ltd. (£5,400); the manager.

Glasgow.—Houses (148), Holmfauldhead Road; housing director. Chemical department for the University; J. Train & Co., Ltd., contractors, 30, George Square. Shops, Carmunnock Road; Mactaggart & Nickel, Ltd. Alterations to Theatre Royal; Howard & Wyndham, Ltd.

Gorleston-on-Sea.—Houses (52), Lowestoft Road; Stradbrooke Estate, Ltd.

Gravesend.—Houses (14), Valley Drive; F. T. Mattocks. Houses (42), West Court Farm estate; J. Nunn.

Great Yarmouth.—Library, Newtown (£4,000), and police station, Gorleston-on-Sea; borough engineer.

Hebburn-on-Tyne.—Houses (155), for the North-Eastern Housing Association; T. A. Page, Son and Bradbury, architects, 67, King Street, South Shields. Houses (152), Victoria Road West estate; Carr-Ellison Estate, Ltd., Collingwood Street, Newcastle-on-Tyne. Flats (32), Frobisher Street and Howe Street, for R. Finn; J. W. Hanson and Sons, architects, Eldon Square, Newcastle-on-Tyne.

Hertford.—Houses (63), Horns Mill scheme (£22,807); A. P. C. Wray, Ltd., Church Road, Bengeo, Hertford.

Hove.—Houses (14), Poplar Avenue; H. L. Ford. Hotel, Flag Court site, Kingsway; Jackson & Greenen.

Hyde.—School, Flowery Field (£19,500), for E.C.

Irish Free State.—(DUBLIN).—Alterations and additions to the Royal Victoria Eye and Ear Hospital, for the Council of the Hospital; F. G. Hicks, 86, Merrion Square, and Vincent Kelly, 87, Merrion Square, joint architects, South Dublin.

Irlam.—Houses (84), between Ship Canal and Lytherton Avenue; Firth Estates, Ltd.

Lancashire.—School (£20,000), Newton-le-Willows, for County E.C.; county architect, Preston.

Leeds.—Cinema, Stanningley Road, for A. Cansfield. Cinema, Upper Town Street, for H. Womersley.

Leicester.—Houses (400) and shops, Braunstone; housing architect, 18, Highcross Street.

Lerwick.—Houses (180); A. A. Foote, 106, Hanover Street, Edinburgh.

Lincoln.—Houses, St. Giles estate (£53,660) and Monks Tower estate; A. Adlington, engineer and surveyor. Factory, Newark Road, for Smith's Potato Crisps (1929), Ltd.

Liverpool.—Houses (36), Manor Way and Northway; J. L. Rawthorne & Co., Muirhead Avenue, Old Swan.

London.—(ST. MARYLEBONE).—Library and health buildings, Town Hall (£104,192); Stewart & Partners, Ltd., 105, Baker Street, W.1. Offices, 119-125, Marylebone Road; F. W. Charity, Tudor House, Ashley Drive, Walton-on-Thames. Shops and flats, Frampton Street; Snell & Co., 47, Maida Vale, W.9. Shops and offices, Baker Street, Paddington, and Chiltern Street; J. S. Beard & Bennett, 101, Baker Street, W.1. (WESTMINSTER).—Extensions to Poland Street garage; Poland Street Estates, Ltd. (W.1).—Rebuilding medical school (£165,000), Middlesex Hospital, Mortimer Street, W.1; Young & Hall, architects, 17, Southampton Street, W.C.1. (ST. PANCRAS).—Tenements, Queen's Crescent (£100,911); Parker Construction Co., Ltd., Shell Mex House, Strand, W.C.2.

Lowestoft.—Development of esplanade (£29,000); borough engineer. Extensions to nurses' home, Alexander Road; North Suffolk Hospital governors.

Maidenhead.—Cinema, Market Street; L. Morris.

Malton (YORKSHIRE).—Houses (50), various parishes; R.D.C. surveyor.

Mangotsfield.—Houses (36), Soundwell estate; surveyor, Council House, Staple Hill, Bristol.

Newcastle-on-Tyne.—General stores building at Walkergate hospital for C.C.; Kirk & Dickinson, builders, New Bridge Street.

Newcastle (STAFFORDSHIRE).—Shops and offices, Merrial Street (£10,102), and shops and offices, High Street and New Street; borough surveyor.

North Berwick.—Cinema for Scott's Empires, Ltd.

Northern Ireland.—(BANGOR, Co. DOWN).—Cinema and shops, Main Street, for the Irish Theatres, Ltd.; J. Neill, architect, Ann Street, Belfast.

Northumberland.—Additions to Lemington secondary school for C.C.; J. Murray, builder, Heddon-on-the-Wall.

Nottingham.—Police and fire brigade headquarters (£183,547); R. M. Finch, engineer and surveyor, Guildhall.

Paisley.—Extensions to works for A. Bell & Sons, Ltd., Hawkhead Road.

Peckham.—Cinema, High Street; A. Mather, Leicester Square Chambers, Leicester Square, London, W.C.2.

Portsmouth.—Extensions to factory aerodrome; D. Rowell & Co. Rebuilding Granada Hotel, Granada Road; Brickwood & Co., Ltd.

Rhondda.—Gymnasium, domestic subjects hall and handicraft hall, Trealaw; R. S. Griffiths and Partners, architects, Tonypandy.

Rothwell.—Houses (39), Lofthouse estate; F. Hartley, U.D.C. architect, Council Offices, Rothwell, near Leeds.

Rowley Regis.—Factory, Doulton Road, Rowley; F. Stacey & Co.

St. John's Wood.—Restaurant, flats and shops, St. John's Wood Road, Lodge Road and Oak Tree Road; Gunton & Gunton, Empire House, St. Martin's le Grand, London, E.C.1.

Saddleworth.—Houses (54), near Memorial, Austerlands; C. H. Dyson, Chadderton.

Sheffield.—Shops and flats, Herries Road; M. J. Gleeson, Ltd., builders. Additions to works, Tinsley Park Road; J. Wilkinson & Co., Ltd., Attercliffe.

Sleaford.—Development of East Road estate; A. M. Cole.

Southport.—Cinema (£60,000), junction of Nelson Street and Lord Wellington Street, for the Associated British Cinemas, Ltd. Extensions to Farnborough Road school (£16,731) for E.C.

South Shields.—Cinema, Marsden Road; J. H. Morton & Sons, architects, Martin's Bank Chambers, Fowler Street.

Spalding.—Enlargement of market (£22,234); U.D.C. surveyor.

Stanley (YORKSHIRE).—Houses (70), near Ruskin Avenue; Jackson & Co.

Stockport.—Cinema, swimming pool, tennis courts, car park, &c., London Road, Poynton, for the Poynton Cinemas, Ltd.; G. Clayton, architect, 4, Wellington Street, Stockport.

Strood (ROCHESTER).—Houses (28), Halling and Stoke; H. E. Budds, builder, Broadstairs, Thanet.

Sunderland.—Houses (1,611), various areas; J. E. Lewis, borough engineer.

Swanscombe.—Houses (36), clearance area; U.D.C. surveyor.

Tenterden (KENT).—Houses (36), Graythorne estate; R. E. Craig, Graythorne estate office.

Thornaby-on-Tees.—Cinema; A. Robinson, builder.

Upholland (WIGAN).—Houses (20), Alma Hill site; T. Dickinson & Sons, builders, Holland Moor.

Wakefield.—Houses (54), Hall Green estate, Painthorpe Lane, New Crofton, and Jubilee Road, Sharlston; R.D.C. surveyor.

Walsall.—Houses (170), Skip Lane and Lodge Road, Cottage Farm estate; G. Linnecor, builder, 154, New Town Road, Aston Cross, Birmingham.

Wath-on-Dearne.—Houses (90), Newhill estate; H. Cranage, surveyor, Town Hall.

Wellingborough.—Extensions to Cottage Hospital; Management Committee.

Wembley.—Factory; Celotex, Ltd., 324, Australia House, London, W.C.2.

West Bromwich.—Factory, Roebuck Lane; Norton Harty Engineering Co., Ltd., Tipton, Staffordshire.

Whitwood.—Houses (58), Cutsyke Hill (£29,732); Leach Bros., Ltd., Park Lane, Pontefract.

Worcestershire.—School, Halesowen, for County E.C.; William Cooper & Son, Ltd., Blackheath, Birmingham.

Wrexham.—Factory, near Bangor-on-Dee; Cadbury Bros., Ltd.

A Nickel Alloy Sales Convention

Representatives from twelve European countries are to meet at the annual sales convention of Henry Wiggin & Co., Ltd., to be held from October 25th to 29th. A full programme has been arranged for the visitors, and they will inspect not only the company's plants at Birmingham, but also the Clydach refinery of the Mond Nickel Co., Ltd. A series of discussions will take place on the applications of nickel, monel and inconel, the range and scope of the Wiggin chemical salts, the development of depolarised and other anodes, also on the work of the Bureau of Information on Nickel.